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BEFORE THE

ARIZONA CORPORATION COMMISSION

IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR A HEARING TO DETERMINE THE FAIR VALUE OF THE UTILITY PROPERTY OF THE COMPANY FOR RATEMAKING PURPOSES, TO FIX A JUST AND REASONABLE RATE OF RETURN THEREON, TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP SUCH RETURN	**DOCKET NO. E-01345A-16-0036**
IN THE MATTER OF FUEL AND PURCHASED POWER PROCUREMENT AUDITS FOR ARIZONA PUBLIC SERVICE COMPANY	**DOCKET NO. E-01345A-16-0123**

Arizona Corporation Commission
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Direct Testimony and Exhibits of

Michael P. Gorman

On behalf of

Federal Executive Agencies

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December 21, 2016

BRUBAKER & ASSOCIATES, INC.

Project 10268

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Table of Contents to the Direct Testimony of Michael P. Gorman

Page

I. SUMMARY 2
II. RATE OF RETURN 6
  II.A. Electric Industry Authorized Returns on Equity, Access to Capital, and Credit Strength 7
  II.B. Regulated Utility Industry Market Outlook 13
  II.C. APS Investment Risk 20
III. APS'S PROPOSED CAPITAL STRUCTURE 21
  III.A. Embedded Cost of Debt 28
IV. RETURN ON EQUITY 29
  IV.A. Risk Proxy Group 30
  IV.B. Discounted Cash Flow Model 33
  IV.C. Sustainable Growth DCF 37
  IV.D. Multi-Stage Growth DCF Model 38
  IV.E. Risk Premium Model 46
  IV.F. Capital Asset Pricing Model ("CAPM") 53
  IV.G. Return on Equity Summary 58
  IV.H. Financial Integrity 59
V. RESPONSE TO APS WITNESS DR. BENTE VILLADSEN 62
  V.A. Dr. Villadsen's CAPM Analysis 70
  V.B. Dr. Villadsen's DCF Analysis 75
  V.C. Dr. Villadsen's Risk Premium Analyses 77
  V.C. ROR-FVRB 85
  V.D. Fair Value Revenue Increment 87
Qualifications of Michael P. Gorman .... Appendix A
Exhibit MPG-1 through Exhibit MPG-22

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Direct Testimony of Michael P. Gorman

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A Michael P. Gorman. My business address is 16690 Swingley Ridge Road, Suite 140, Chesterfield, MO 63017.

Q WHAT IS YOUR OCCUPATION?

A I am a consultant in the field of public utility regulation and a Managing Principal of Brubaker & Associates, Inc., energy, economic and regulatory consultants.

Q PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.

A This information is included in Appendix A to my testimony.

Q ON WHOSE BEHALF ARE YOU APPEARING IN THIS PROCEEDING?

A I am appearing in this proceeding on behalf of the Federal Executive Agencies ("FEA").

I. SUMMARY

Q WHAT IS THE SUBJECT MATTER OF YOUR TESTIMONY?

A I recommend an adjustment to APS's proposed Required Operating Income ("ROI"), which is the product of a fair rate of return and rate base. I recommend a fair ROI based on an overall rate of return on original cost rate base ("ROR-OCRB") and Fair Value Rate Base ("ROR-FVRB") that is fair, just and reasonable. I will also respond to the Company's requested ROI and, specifically the reasonableness of APS's proposed ROR-OCRB and ROR-FVRB. My silence in regard to any issue should not be construed as an endorsement of APS's position.

Q PLEASE DESCRIBE THE COMPANY'S REVENUE INCREASE REQUEST IN THIS PROCEEDING.

A The Company is requesting a base rate increase of $433.4 million, or a 15% increase. This base rate increase is being offset by the roll-in to base rates of $267.6 million of revenue that are currently being collected in adjustor mechanisms. As such, the net increase in revenue to APS under the filing in this case is $165.9 million, or 5.74%. (Company Application at pages 4-5).

The Company developed its requested base rate increase based on its ROR-FVRB. As shown in the Company's Application on Schedule A-1, the Company derives a revenue deficiency in base rates of $433.4 million based on a 5.84% ROR-FVRB applied to a fair value rate base of $9,976 million. Using the fair value methodology increases the claimed revenue deficiency by $51.9 million which APS terms the "Fair Value Increment." The Fair Value Increment represents additional revenue requirement above the Company's requested ROR-OCRB which produced a revenue deficiency in this proceeding of only $381.6 million. (Direct Testimony of

Applicant witness Leland R. Snook at Attachment LRS-3DR, page 1). I have replicated APS witness Snook's Attachment LRS-3DR on my Exhibit MPG-1.

Significantly, the $51.9 million Fair Value Increment represents approximately 31% of the total claimed net revenue increase of $165.9 million that APS seeks in this proceeding. Further, because the Company requests an original cost return on common equity of 10.5% plus the proposed Fair Value Increment, APS will have an opportunity to earn a return on equity on OCRB of approximately 11.4%.[1] This compares to the electric utility industry average authorized returns on equity in 2015 and 2016 of about 9.6%.

The Company's requested operating income, and combined request to earn up to a return on common equity of 11.4% creates significant and unjustified rate burdens on APS's retail electric customers. Therefore, the Company's requested operating income, and rate of return are excessive, imbalanced and produce rates that are not just and reasonable.

Q PLEASE SUMMARIZE YOUR PROPOSED ADJUSTMENT TO APS'S REQUESTED OPERATING INCOME.

A For the reasons outlined in this testimony, I recommend that the Company's claimed revenue deficiency be based on an ROR-OCRB. The Company's claim for a $51.9 million Fair Value Increment revenue requirement creates excessive price burdens on its electric customers, and provides APS an opportunity to earn an excessive rate of return on utility rate base investments.

As outlined in this testimony, a reasonable ROR-OCRB will provide fair compensation to investors, will maintain market-to-book ratios in line with what APS witness Dr. Villadsen has estimated to represent a fair return on APS's fair value rate base. I state this simply by recognizing that the industry authorized returns for electric utility companies are largely driven by fair rates of return on original cost rate base. Because the market valuation of utility stock is tied to the market's earnings and cash flow outlooks, the observable valuations of electric utility stocks relative to their book value ratios as reviewed by APS witness Dr. Villadsen supports establishing APS's operating income, and revenue requirement based strictly on the ROR-OCRB.

---

[1] Fair value increment would increase the original cost rate of return from 8.13% to 8.60%. Implied return on equity is equal to (8.6% - 2.27%) ÷ 55.8% = 11.4%.

Based on my assessment of APS's current market cost of common equity, I recommend a return on equity in the range of 8.8% up to 9.3%. This return on equity will provide fair compensation to APS investors for APS's level of investment risk, and a return that is competitive with returns on alternative comparable risk investments.

I also take issue with APS's proposed capital structure. APS's capital structure contains approximately 55.8% common equity and 44.2% debt. I based my recommended capital structure on bond rating credit metrics, including off-balance sheet debt equivalents, electric utility industry results and the comparable risk proxy group used to estimate APS's return on equity.

I recommend a capital structure of approximately 50% and 50% debt to use to set rates in this proceeding.

As shown on my Exhibit MPG-2, I recommend an ROR-OCRB of 7.12%. This reflects my recommended return on equity at the midpoint of my range, and my recommended capital structure for APS.

While I do not believe it is appropriate for providing fair compensation in this case, if the Commission chooses to again provide a Fair Value Increment to establish APS's revenue requirement in this proceeding, I take issue with the Company's proposal for a Fair Value Increment of 1.0%. The Company's analysis ties to previous findings by the Commission, rather than to consider current capital market costs. As outlined later in this testimony, if a Fair Value Increment is allowed, it should be no higher than 0.55%. This represents an updated estimate of the current market real rate of return as a current Fair Value return increment. Using this fair value rate of return increment, and the methodology the Company used to establish an ROR-FVRB, as shown on my Exhibit MPG-2, I recommend an ROR-FVRB of 5.01%. This Fair Value Increment would result in a fair value revenue requirement increment of $28.6 million as shown on my Exhibit MPG-2, which is far more reasonable than the revenue increment requested by APS.

Q DO YOU RESPOND TO APS'S PROPOSED ROR-OCRB?

A Yes. I will also respond to APS witness Mr. Leland R. Snook and Dr. Villadsen's recommended ROR-OCRB of 8.13%, which includes a return on common equity of 10.50%, and a capital structure composed of 55.8% common equity and 44.2% debt.

Q PLEASE DESCRIBE YOUR RECOMMENDATION ON AN ROR-FVRB.

A I have revised the Company's fair value rate of return recommendation based on my ROR-OCRB, and an update to the Fair Value Increment. As developed on my Exhibit MPG-2, these revisions to the Company's proposed ROR-FVRB results in a fair ROR-FVRB of 5.01%.

While I update the Company's fair value rate of return estimate, I also describe why I believe that the use of a fair value methodology should not produce an ROI for APS that is substantially different from the ROI measured from a fair ROR-OCRB. Using a fair value and original cost methodology are two methodologies of estimating a fair ROI entitlement for the utility. I do not agree with APS's characterization that the fair value methodology should be used to add an increment above the ROI that represents a fair ROR-OCRB using a fair value methodology.

Q WILL YOU COMMENT ON THE REASONABLENESS OF APS'S REQUESTED ROR-FVRB?

A Yes. APS is requesting an ROR-FVRB of 5.84%.[2] The Company's ROR-FVRB reflects a continuation of a Fair Value Increment of 1 percentage point awarded in its last several rate cases. Importantly, APS has made no attempt to measure a current ROR-FVRB in the current marketplace. In its last rate case, a Fair Value Increment was tied to Staff witness Parcell's methodology, which included a range of 0% up to 2 percentage point real return estimate. The awarded fair value rate of return was approximately 50% of his real return estimate of 2 percentage points. Using the same methodology, a fair value rate of return in the current marketplace would be 0.55%. An appropriate fair value rate of return increment would be 0%, because it would provide APS fair compensation on its investment in utility plant and equipment. However, if the Commission chooses to award an ROR-FVRB in this proceeding, it should be no higher than 0.55%.

II. RATE OF RETURN

Q PLEASE DESCRIBE THIS SECTION OF YOUR TESTIMONY.

A In this section of my testimony, I will explain the analysis I performed to determine the reasonable rate of return in this proceeding and present the results of my analysis. I begin my estimate of a fair return on equity by reviewing the authorized returns approved by the regulatory commissions in various jurisdictions, the market assessment of the regulated utility industry investment risk, credit standing, and stock price performance. I used this information to get a sense of the market's perception of the risk characteristics of regulated utility investments in general, which is then used to produce a refined estimate of the market's return requirement for assuming investment risk similar to APS's utility operations.

---

[2] Attachment LRS-3DR.

As described below, I find the credit rating outlook of the industry to be strong, supportive of the industry's financial integrity, and access to capital. Further, regulated utilities' stocks have exhibited strong price performance over the last several years, which is evidence of utility access to capital.

Based on this review of credit outlooks and stock price performance, I conclude that the market continues to embrace the regulated utility industry as a safe-haven investment option and views utility equity and debt investments as low-risk investments.

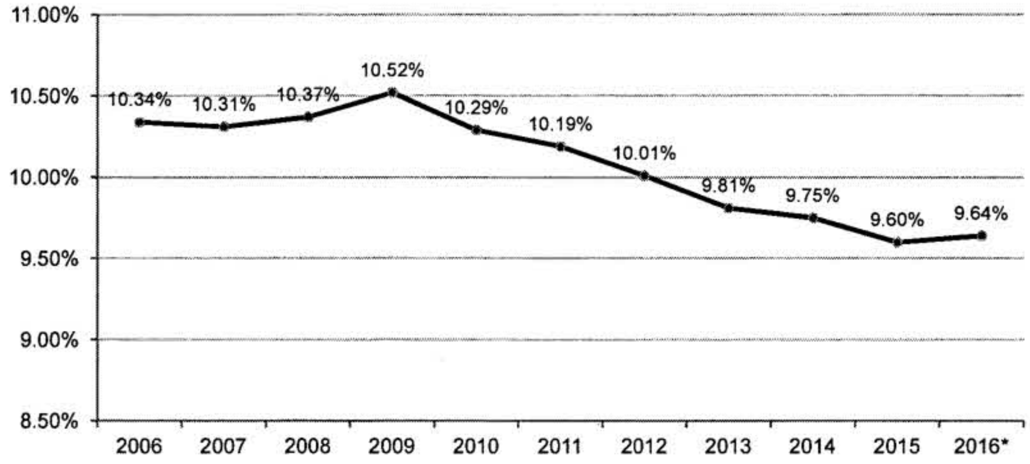
II.A. Electric Industry Authorized Returns on Equity, Access to Capital, and Credit Strength

Q PLEASE DESCRIBE THE OBSERVABLE EVIDENCE ON TRENDS IN AUTHORIZED RETURNS ON EQUITY FOR ELECTRIC UTILITIES, ELECTRIC UTILITIES' CREDIT STANDING, AND ELECTRIC UTILITIES' ACCESS TO CAPITAL TO FUND INFRASTRUCTURE INVESTMENT.

A Authorized returns on equity for electric utilities have been steadily declining over the last 10 years as illustrated in the graph below. More recent authorized returns on equity for electric utilities have declined down to about 9.6%.

Figure 1

Authorized Electric Returns on Equity
(Excludes Limited Issue Riders)



Source and Note:
Regulatory Research Associates, Inc., Regulatory Focus, Major Rate Case Decisions -- January - September 2016, October 14, 2016 at page 6.

* The data includes the period Jan - Sep 2016.

As illustrated on the graph above, excluding the limited issue rider decisions, the authorized return on equity for electric utilities has steadily declined in 2015/2016 from preceding periods.

While the declines in authorized returns on equity are public knowledge, and align with declining capital market costs, utilities are maintaining strong investment grade credit standing, and have been able to attract large amounts of capital at low costs to fund very large capital programs.

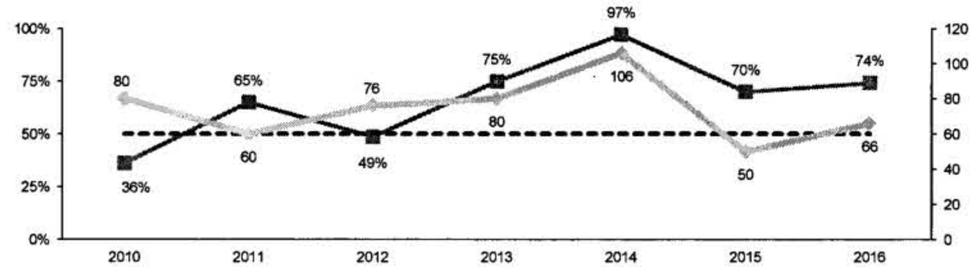
Q PLEASE DESCRIBE THE TREND IN CREDIT RATING CHANGES IN THE ELECTRIC UTILITY INDUSTRY OVER THE LAST FIVE YEARS.

A As shown below in Table 1, over the period 2010 through September 2016, the electric utility industry has experienced a significant number of upgrades in credit ratings by all of the major credit rating agencies (Fitch Ratings, Moody's, and Standard & Poor's).

TABLE 1

Credit Rating Changes
(U.S. Shareholder-Owned Electric Utility Industry)

	2010	2011	2012	2013	2014	2015	YTD 2016
Upgrades	29	39	37	60	103	35	49
Downgrades	51	21	39	20	3	15	17
% Upgrades	36%	65%	49%	75%	97%	70%	74%
Total Rating Activity	**80**	**60**	**76**	**80**	**106**	**50**	**66**



Source: EEI Q3 2016 Credit Ratings, Tab IV Direction of Rating Action.

As noted above in Table 1, the upgrades in utility credit ratings started outpacing downgrades in 2011, and more recently, the number of upgrades has substantially exceeded the number of downgrades. For example, in 2014, there were 103 upgrades and only three downgrades. In 2015, the number of upgrades was more than twice the number of downgrades (35 upgrades and 15 downgrades).

Q HOW DID THIS CREDIT RATING ACTIVITY IMPACT THE CREDIT RATING OF THE ELECTRIC UTILITY INDUSTRY?

A The credit rating changes for the electric utility industry reflect a significant strengthening of the electric utility industry credit rating. As shown in Table 2 below, in 2008, approximately 69% of the electric utility industry was rated from BBB- to BBB+, 18% had a bond rating better than BBB+, and around 13% of the industry was below investment grade. This industry rating improved steadily over the subsequent six years. By the third quarter of 2016, only 3% of the industry was below investment grade, around 65% continued to be in the range of BBB- to BBB+, and over 32% of the industry had a bond rating above BBB+. Overall, the improvement to the credit rating of the electric utility industry has been very significant.

TABLE 2

S&P Ratings by Category
(Year End)

Description	2008	2012	2013	2014	2015	2016 Q3
Regulated						
A or higher	8%	6%	3%	3%	3%	5%
A-	10%	17%	20%	21%	22%	27%
BBB+	23%	14%	17%	32%	33%	35%
BBB	23%	36%	49%	37%	33%	22%
BBB-	23%	17%	6%	3%	3%	8%
Below BBB-	13%	11%	6%	5%	6%	3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Sources: EEI Q3 2016 Credit Ratings, Tab V – S&P Rating by Comp. Category.

Q HAVE CREDIT RATING AGENCIES COMMENTED ON DECLINING AUTHORIZED RETURNS ON EQUITY?

A Yes. Credit rating agencies recognize the declining trend in authorized returns and the expectation that regulators will continue lowering the returns for U.S. utilities while maintaining a stable credit profile. Specifically, Moody's states:

> **Lower Authorized Equity Returns Will Not Hurt Near-Term Credit Profiles**
>
> The credit profiles of US regulated utilities will remain intact over the next few years despite our expectation that regulators will continue to trim the sector's profitability by lowering its authorized returns on equity (ROE).[3]

Further, in a recent report, S&P states:

> **2. Earned returns will remain in line with authorized returns**
>
> Authorized returns on equity granted by U.S. utility regulators in rate cases this year have been steady at about 9.5%. Utilities have been adept at earning at or very near those authorized returns in today's economic and fiscal environment. A slowly recovering economy, natural gas and electric prices coming down and then stabilizing at fairly low levels, and the same experience with interest rates have led to a perfect "non-storm" for utility ratepayers and regulators, with utilities benefitting alongside those important constituencies. Utilities have largely used this protracted period of favorable circumstances to consolidate and institutionalize the regulatory practices that support earnings and cash flow stability. We have observed and we project continued use of credit-supportive policies such as short lags between rate filings and final decisions, up-to-date test years, flexible and dynamic tariff clauses for major expense items, and alternative ratemaking approaches that allow faster rate recognition for some new investments.[4]

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[3] *Moody's Investors Service*, "US Regulated Utilities: Lower Authorized Equity Returns Will Not Hurt Near-Term Credit Profiles," March 10, 2015.

[4] *Standard & Poor's Ratings Services*: "Corporate Industry Credit Research: Industry Top Trends 2016, Utilities," December 9, 2015, at 23, emphasis added.

Q HAVE UTILITIES BEEN ABLE TO ACCESS EXTERNAL CAPITAL TO SUPPORT INFRASTRUCTURE CAPITAL PROGRAMS?

A Yes. While cost of capital and authorized returns on equity were declining, the utility industry has been able to fund substantial increases in capital investments needed for infrastructure modernization and expansion. The Edison Electric Institute ("EEI") reported in a 2015 financial review of the electric industry financial performance that in 2011 electric "industry-wide capex has more than doubled since 2005."[5]

EEI also observed that, despite this nearly tripling of capital expenditures during the period 2005-2015, a majority of the funding for utilities' capital expenditures has been provided by internal funds. EEI reports approximately 25% of funding needed to meet these increasing capital expenditures has been derived from external sources and 75% of these capital expenditures have been funded by internal cash. Further, despite nearly tripling capital expenditures, the electric utility industry debt interest expense has declined by approximately 1.9% despite increases in the amount of outstanding debt.[6] This is clear proof that capital market costs have declined.

Q IS THERE EVIDENCE OF ROBUST VALUATIONS OF ELECTRIC UTILITY SECURITIES?

A Yes. These robust valuations are an indication that utilities can sell securities at high prices, which is a strong indication that they can access capital under reasonable terms and conditions, and at relatively low cost. As shown on my Exhibit MPG-3, the historical valuation of the electric utilities based on a price-to-earnings ratio, price-to-cash flow ratio and market price-to-book value ratio, indicates utility security valuations today are very strong and robust relative to the last 10 to 15 years. These strong valuations of utility stocks indicate that utilities have access to equity capital under reasonable terms and costs.

---

[5] Edison Electric Institute, *2015 Financial Review, Annual Report of the U.S. Investor-Owned Electric Utility Industry*, page 17.

[6] *Id.*, pages 8 and 11.

Q HOW SHOULD THE COMMISSION USE THIS MARKET INFORMATION IN ASSESSING A FAIR RETURN FOR APS?

A Market evidence is quite clear that capital market costs are near historically low levels. Authorized returns on equity have fallen to the low to mid 9.0% area; utilities continue to have access to large amounts of external capital to fund large capital programs; and utilities' investment grade credit standings are stable to improving. The Commission should carefully weigh all this important observable market evidence in assessing a fair return on equity for APS.

II.B. Regulated Utility Industry Market Outlook

Q PLEASE DESCRIBE THE CREDIT RATING OUTLOOK FOR REGULATED UTILITIES.

A Regulated utilities' credit ratings have improved over the last few years and the outlook has been labeled "Stable" by credit rating agencies. Credit analysts have also observed that utilities have strong access to capital at attractive pricing (i.e., low capital costs), which has supported very large capital programs.

Standard & Poor's ("S&P") recently published a report titled "Corporate Industry Credit Research: Industry Top Trends 2016, Utilities." In that report, S&P noted the following:

> **Ratings Outlook.** Stable with a slight bias toward the negative. Utilities in the U.S. continue to enjoy a confluence of financial, economic, and regulatory environments that are tailor-made for supporting credit quality. Low interest rates, modest economic

> growth, and relatively stable commodity costs make for little pressure on rates and therefore on the sunny disposition of regulators.

> **Credit Metrics.** We see credit metrics remaining within historic norms for the industry as a whole and do not project overall financial performance that would affect the industry's creditworthiness.
>
> **Industry Trends.** Taking advantage of the favorable market conditions, utilities have been maintaining aggressive capital spending programs to bolster system safety and reliability, as well as technological advances to make the systems "smarter." The elevated spending has not led to large rate increases, but if macro conditions reverse and lead to rising costs that command higher rates, we would expect utilities to throttle back on spending to manage regulatory risk.[7]

Similarly, Fitch states:

> **Stable Financial Performance:** The stable financial performance of Utilities, Power & Gas (UPG) issuers continues to support a sound credit profile for the sector, with 93% of the UPG portfolio carrying investment-grade ratings as of June 30, 2015, including 65% in the 'BBB' rating category. Second-quarter 2015 LTM [Long-Term Maturity] leverage metrics remained relatively unchanged year over year (YOY) while interest coverage metrics modestly improved. Fitch Ratings expects this trend to broadly sustain for the remainder of 2015, driven by positive recurring factors.
>
> **Low Debt-Funded Costs:** The sustained low interest rate environment has allowed UPG companies to refinance high-coupon legacy debt with lower coupon new debt. Gross interest expense on an absolute value represented approximately 4.6% of total adjusted debt as of June 30, 2015, a decline of about 150 bps from the 6.1% recorded in the midst of the recession. Fitch believes a rise in interest rates would largely be neutral to credit quality, as issuers have generally built enough headroom in coverage metrics to withstand higher financing costs.
>
> **Capex Moderately Declining:** Fitch expects the capex/depreciation ratio to be at the lower end of its five-year historical range of 2.0x–2.5x in the near term, reflecting a moderate decline in projected capex from the 2011–2014 highs. The capex depreciation ratio was relatively flat YOY at about 2.4x. Capex targets investments toward base infrastructure upgrades, utility-scale renewables and transmission investments.

* * *

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[7] *Standard & Poor's Ratings Services*: "Corporate Industry Credit Research: Industry Top Trends 2016, Utilities," December 9, 2015, at 22, emphasis added.

> Key credit metrics for IUCs [investor-owned utility companies] remained relatively stable YOY and continue to support the sound credit profiles and Stable Outlooks characteristic of the sector. EBITDAR [Earnings Before Interest, Taxes, Depreciation, Amortization and Rent] and FFO [Funds From Operations] coverage ratios were 5.6x and 5.9x, respectively, for the LTM ended second-quarter 2015, while adjusted debt/EDITDAR and FFO-adjusted leverage were 3.5x and 3.4x, respectively.[8]

Moody's recent comments on the U.S. Utility Sector state as follows:

> Our outlook for the US regulated utilities industry is stable. This outlook reflects our expectations for fundamental business conditions in the industry over the next 12 to 18 months.
>
> » **The credit-supportive regulatory environment is the main reason for our stable outlook.** We expect that the relationship between regulators and utilities in 2016 will remain credit-supportive, enabling utilities to recover costs in a timely manner and maintain stable cash flows.
>
> » **We estimate that the ratio of cash flow from operations (CFO) to debt will hold steady at about 21%, on average for the industry, over the next 12 to 18 months.** The use of timely cost-recovery mechanisms and continued expense management will help utilities offset a lack of growth in electricity demand and lower allowed returns on equity, enabling financial metrics to remain stable. Tax benefits tied to the expected extension of bonus depreciation will also support CFO-to-debt ratios.
>
> * * *
>
> » **Utilities are increasingly using holding company leverage to drive returns, a credit negative.** Although not a driver of our outlook, utilities are using leverage at the holding company level to invest in other businesses, make acquisitions and earn higher returns on equity, which could have negative implications across the whole family.[9]

---

[8] *Fitch Ratings*: "U.S. Utilities, Power & Gas Data Comparator," September 21, 2015, at 1 and 7, emphasis added.

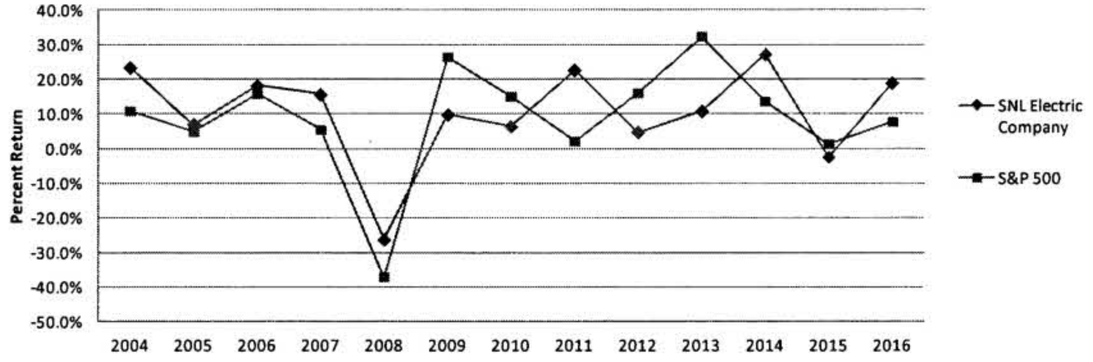
[9] *Moody's Investors Service*: "2016 Outlook – US Regulated Utilities: Credit-Supportive Regulatory Environment Drives Stable Outlook," November 6, 2015, at 1, emphasis added.

Q PLEASE DESCRIBE UTILITY STOCK PRICE PERFORMANCE OVER THE LAST SEVERAL YEARS.

A As shown in the graph below, SNL Financial has recorded utility stock price performance compared to the market. The industry's stock performance data from 2004 through September 2016 shows that the SNL Electric Company Index has outperformed the market in downturns and trailed the market during recovery. This relatively stable price performance for utilities supports my conclusion that utility stock investments are regarded by market participants as a moderate- to low-risk investment.

FIGURE 2

Index Comparison



Source: SNL Financial, data through September 30, 2016.

Q HAVE ELECTRIC UTILITY INDUSTRY TRADE ORGANIZATIONS COMMENTED ON ELECTRIC UTILITY STOCK PRICE PERFORMANCE?

A Yes. In its 4th Quarter 2015 Financial Update, the EEI stated the following concerning the EEI Electric Utility Stock Index ("EEI Index"):

> EEI Index returns during 2015 embodied the larger pattern seen in Table I since the 2008/2009 financial crisis, as industry business models have migrated to an increasingly regulated

> emphasis. The industry has generated consistent positive returns but has lagged the broader markets when markets post strong gains, which in turn have been sparked both by slow but steady U.S. economic growth and corporate profit gains and by the willingness of the Federal Reserve to bolster markets with historically unprecedented monetary support in the form of three rounds of quantitative easing and near-zero short-term interest rates. While the Fed did raise short-term rates in December 2015 for the first time since 2006 (from zero to a range of 0.25% to 0.50%), this hardly effects [sic] longer-term yields, which remain at historically low levels and are influenced more by the level of inflation and economic strength than by the Fed's short-term rate policy.
>
> * * *
>
> **Regulated Fundamentals Remain Stable**
>
> The rate stability offered by state regulation and the ability to recover rising capital spending in rate base shield regulated utilities from the volatility in the competitive power arena and turn the growth of renewable generation (and the resulting need for new and upgraded transmission lines) into a rate base growth opportunity for many industry players.
>
> * * *
>
> In the shorter-term, analysts continue to see opportunity for 4-6% earnings growth for regulated utilities in general along with prospects for slightly rising dividends (with a dividend yield now at about 4% for the industry overall). That formula has served utility investors quite well in recent years, delivering long-term returns equivalent to those of the broad markets but with much lower volatility. Provided state regulation remains fair and constructive in an effort to address the interests of ratepayers and investors, it would appear that the industry can continue to deliver success for all stakeholders, even in an environment of flat demand and considerable technological change.[10]

---

[10] *EEI Q4 2015 Financial Update*: "Stock Performance" at 4 and 6, emphasis added.

Q HAVE YOU CONSIDERED CONSENSUS MARKET OUTLOOKS FOR CHANGES IN INTEREST RATES IN FORMING YOUR RECOMMENDED RETURN ON EQUITY IN THIS CASE?

A Yes. The outlook for changes in interest rates has been highly impacted by expected actions by the Federal Reserve Bank Open Market Committee changes in short-term interest rates, and outlooks for inflation and GDP growth after the recent Presidential election. The most recent consensus outlook on these factors is stated in the December 2016 *Blue Chip Financial Forecasts* as follows:

> At present, our panelists seem much more skeptical than fixed income market participants that economic growth, inflation, or both will shoot higher over the next year and a half. There was very little change over the past month in consensus forecasts of economic growth and inflation over the forecast horizon. While annual real GDP growth in 2017 is expected to exceed that in 2016, it still is forecast to closely adhere to the slightly more than 2.0% average that has prevailed since the end of the Great Recession. Consensus forecasts of inflation also underwent little change this month. The GDP price index still is expected to register annualized rates of increase of slightly more than 2.0% through Q1 2018, while the Consumer Price Index is forecast to post annualized rates of increase about 0.2 of a percentage point greater than that.
>
> * * *
>
> All of our panelists also expect the FOMC to hike rates by a quarter-point in December, according to a special question asked of our panelists this month. We also saw some upward adjustment to consensus forecasts of interest rates and yields over the forecast horizon. However, it seemed to largely reflect a simple mark-to-marking of forecasts given the post-election run-up in interest rates. Yes, the consensus still looks for rates and yields to rise over the forecasts horizon, but not at the breakneck pace seen in the immediate post-election period. As for FOMC rate hikes in 2017, 28.9% of our panelists currently foresee only one 25 basis points increase next year, 40.0% see two 25-basis-point increases, 17.8% expect three quarter-point moves, and 13.3% said they anticipate the FOMC to hike rates by 25 basis points four or more times.[11]

Based on these current outlooks, the consensus 30-year Treasury bond yield projections forecast an increase from current yields of 2.5% or less, up to 3.4% out over the next two years. Further, long-term outlooks are for the Federal Reserve Funds to increase up to as much as 2.6% to 3% over the five- to 10-year forecast, with 30-year Treasury bond yields increasing to 4.2% to 4.5% over that same time period. These outlooks for short-term and long-term interest rate changes are reflected in my market-based models and inputs used to estimate a fair return on equity for Pepco in this proceeding.

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[11] *Blue Chip Financial Forecasts*, December 1, 2016 at 1, emphasis added.

I also note that the current outlook for interest rate increases over the short-term and intermediate-term forecasts is for increases, but these expectations of increased interest rates have consistently occurred in the past and have consistently turned out to be wrong. That is, interest rates were projected to increase, but instead have stayed flat or declined. As such, while I am considering the expectation of increased capital market costs in the future, I must note that the certainty of increases in capital market costs is at very best problematic.

Q WHAT ARE THE IMPORTANT TAKEAWAY POINTS FROM THIS ASSESSMENT OF UTILITY INDUSTRY CREDIT AND INVESTMENT RISK OUTLOOKS?

A Credit rating agencies consider the regulated utility industry to be "Stable" and believe investors will continue to provide an abundance of low-cost capital to support utilities' large capital programs at attractive costs and terms. All of this reinforces my belief that utility investments are generally regarded as safe-haven or low-risk investments and the market continues to demand low-risk investments such as utility securities. The ongoing demand for low-risk investments can reasonably be expected to continue to provide attractive low-cost capital for regulated utilities.

II.C. APS Investment Risk

Q PLEASE DESCRIBE THE MARKET'S ASSESSMENT OF THE INVESTMENT RISK OF APS.

A The market's assessment of APS's investment risk is described by credit rating analysts' reports. APS's current corporate bond ratings from S&P and Moody's are A- and A2, respectively.[12] APS's outlook from both credit rating agencies is "Stable." Specifically, S&P states:

> **Outlook: Stable**
>
> The stable outlook on Arizona Public Service Co. (APSC) reflects S&P Global Ratings' view that parent company Pinnacle West Capital Corp. will maintain strong relationships with regulators and continue to fund its high capital spending needs in a balanced manner. Pinnacle West's wholly owned subsidiary, APSC, demonstrates acumen in managing its regulatory risk in Arizona, which provides a platform for higher ratings contingent on Pinnacle West's continuing financial prudence in containing costs and financing capital investments.
>
> **Business Risk: Excellent**
>
> Our assessment of APSC's business risk reflects our view of the company's low-risk vertically integrated and regulated electric utility operations, and includes the company's effective management of regulatory risk despite our view of a historically challenging regulatory jurisdiction in Arizona. APSC is a wholly owned subsidiary of Pinnacle West Capital Corp. and provides electricity to a large customer base, serving about 1.2 million customers throughout Arizona, except for parts of Phoenix, Tucson, and Mohave County in northwestern Arizona. Partially offsetting this assessment is the company's limited regulatory diversity, environmental risks associated with the company's coal-fired generation, and operating risks associated with the company's nuclear generation. APSC has about 6,200 MW of generating capacity, about 45% of which reflects base-load generation from nuclear and coal-fired fuel sources.
>
> **Financial Risk: Intermediate**
>
> Our assessment of APSC's financial risk incorporates the use of our medial volatility table and reflects the company's lower-risk regulated utility strategy that includes the higher operating risk of the company's regulated generation. Under our base-case forecast, we expect FFO to

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[12] Villadsen Direct at 10.

> debt to be in the 27%-29% range and debt to EBITDA will be about 3x, indicative of the intermediate financial risk profile category. Furthermore, because of the company's capital spending requirements and dividend payments, we expect APSC's discretionary cash flow will remain negative over the next two years. Key assumptions include average capital spending of $1.2 billion annually, dividends of about $280 million, customer growth of about 1.5%, and a 2016 general rate case filing that we expect will be decided upon by the second half of 2017. We also expect the 2015 bonus depreciation extension will provide cash tax benefits that we expect will partly offset the company's funding needs.[13]

III. APS'S PROPOSED CAPITAL STRUCTURE

Q WHAT IS APS'S PROPOSED CAPITAL STRUCTURE?

A APS's proposed capital structure is shown below in Table 3. This pro forma capital structure ending on December 31, 2015 is sponsored by APS witness Mr. Leland R. Snook.

TABLE 3

APS's Proposed Capital Structure
(December 31, 2015)

Description	Weight
Long-Term Debt	44.20%
Common Equity	55.80%
Total	100.00%

Source: Schedule D-1.

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[13] Standard & Poor's RatingsDirect: "Summary: Arizona Public Service Co." October 12, 2016.

Q IS APS'S PROPOSED CAPITAL STRUCTURE REASONABLE?

A No. Mr. Snook's proposed capital structure contains an unreasonably high common equity ratio of total capital. A capital structure with too much common equity unjustifiably inflates the Company's cost of service, and retail rates. Therefore, I recommend a reasonable capital structure which contains a balanced amount of debt and equity be used to set rates.

Q IF THE COMMISSION FINDS THE COMPANY'S ACTUAL CAPITAL STRUCTURE TO NOT BE REASONABLE, IS IT APPROPRIATE FOR THE COMMISSION TO ADJUST THE RATEMAKING CAPITAL STRUCTURE?

A Yes. APS can adjust its actual capital structure to conform with what the Commission finds to be a reasonable capital structure for ratemaking purposes. This price-setting mechanism encourages APS to make efficient least-cost management decisions in managing its overall cost of service. APS can modify its actual capital structure to conform with what the Commission finds to be reasonable when the rates are in effect.

Q WHY DO YOU BELIEVE APS'S PROPOSED CAPITAL STRUCTURE CONTAINS TOO MUCH COMMON EQUITY?

A I have reached these conclusions for several reasons, including:

1. The Company has not adjusted its capital structure to reflect a significant decline to its off-balance sheet debt obligations. Adjusting its on-balance sheet capital structure to reflect these off-balance sheet obligations will allow it to modify its capital structure in a way that preserves its bond rating, and lowers its overall cost of service.

2. Modifying the Company's capital structure to reflect its declining off-balance sheet debt obligations will allow for a reduced common equity component of total capital while still balancing its total financial obligations, and support its investment grade bond rating.

3. A review of the electric utility industry average ratemaking capital structures, and noting and observing that the market's response to these regulatory decisions indicates that the industry has access to significant amounts of capital under reasonable terms and prices, supports a conclusion that a reasonable ratemaking capital structure for APS is approximately 50% equity and 50% debt.

4. I recommend an adjustment to the APS capital structure will produce a capital structure that is reasonably consistent with the proxy group used to estimate APS's return on common equity in this proceeding.

Q PLEASE EXPLAIN WHY YOU BELIEVE APS'S CAPITAL STRUCTURE COMMON EQUITY COMPONENT HAS BEEN INCREASING OVER TIME WHEN CONSIDERATION IS MADE OF ITS OFF-BALANCE SHEET OBLIGATIONS.

A In assessing the credit strength of APS and other utilities, credit rating agencies consider financial leverage risk by observing on-balance sheet financial obligations, and off-balance sheet obligations. As shown on my Exhibit MPG-4, page 1, APS's actual capital structure over calendar years 2011-2015 are shown in both a regulatory capital structure basis (long-term capital investor capital only), and a financial basis (investor capital and off-balance sheet obligations). As shown on Exhibit MPG-4, page 1, APS's off-balance sheet obligations as recognized by Standard & Poor's have decreased from over $1.19 billion in 2011, down to only $373 million in 2015. APS's off-balance sheet debt is reported by S&P on its S&P Capital IQ website. This significant decline in off-balance sheet obligations happened during a period where on-balance sheet capital increased from $7.4 billion up to almost $8.4 billion. Significantly, off-balance sheet debt obligations relative to the total financial obligations of APS decreased significantly over this time period.

As shown on Exhibit MPG-4, page 1, reflecting off-balance sheet obligations, APS's adjusted debt ratio has decreased from 52.95% in calendar year 2011 down to

46.51% in 2015. Correspondingly, the common equity ratio increased from 47% in 2011 to up to 53.5% in 2015.

It was not reasonable for APS not to modify its debt and equity capital structure mix as its off-balance sheet obligations decreased significantly over this time period.

Q HOW DOES APS'S ADJUSTED DEBT RATIO, BASED ON ITS ACTUAL CAPITALIZATION MIX, COMPARE TO UTILITY INDUSTRY AVERAGE SUGGESTED RATIOS FOR VARIOUS BOND RATINGS?

A Based on APS's proposed capital structure, its adjusted debt ratio would be approximately 46.5% as shown on page 1 of Exhibit MPG-4. As shown in Table 4 below, this adjusted debt ratio for APS would be considerably lower than utility industry medians adjusted debt ratios based on Standard & Poor's credit rating reporting, for utility companies with BBB and A- bond ratings, and adjusted debt ratios of around 50.8% up to 53.6%. For the industry average, which has a corresponding BBB+ bond rating, the industry average adjusted debt ratio is around 52%. The equity component of these companies then would be the reciprocal of this debt ratio, which would imply generally common equity components of total capitalization including off-balance sheet debt of around 48%.

TABLE 4

Operating Utility Subsidiaries
(Industry Medians)

S&P Rating[1]	Adj. Debt Ratio (1)	Distribution (50% - 55%) (2)
AA	42.6%	–
A	51.5%	78%
A-	51.7%	35%
BBB+	54.3%	36%
BBB	52.9%	38%
APS	46.5%	

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[1] Exhibit MPG-20, page 3.

Q **HOW WOULD APS'S ADJUSTED DEBT RATIO COMPARE TO THE INDUSTRY AVERAGE IF FOR RATEMAKING PURPOSES YOU MODIFY ITS RATEMAKING CAPITAL STRUCTURE TO 50% DEBT AND 50% EQUITY?**

A If APS's capital structure is adjusted to reflect 50% debt and 50% equity at year-end 2015, along with the S&P estimated off-balance sheet debt equivalents for APS, would imply a credit metric adjusted debt ratio of 52.1%, this adjusted debt ratio is developed on my Exhibit MPG-4, page 2. This adjusted debt ratio is reasonably consistent with electric utility median adjusted debt ratios as published by S&P by bond rating as summarized in Table 4 above.

Q WHY YOU DO BELIEVE THAT A 50/50 DEBT/EQUITY RATIO CAPITAL STRUCTURE IS REASONABLY CONSISTENT WITH COMMISSION-AUTHORIZED CAPITAL STRUCTURES FOR THE ELECTRIC UTILITY INDUSTRY?

A Support for this finding is shown below in Table 5.

TABLE 5

Trends in
State Authorized Common Equity Ratios

		Electric Industry	
Line	**Year** **(1)**	**Average** **(2)**	**Median** **(3)**
1	2010	49.5%	49.8%
2	2011	49.1%	49.1%
3	2012	51.5%	52.0%
4	2013	50.1%	51.0%
5	2014	50.3%	50.0%
6	2015	50.2%	50.5%
7	2016*	49.5%	50.0%
8	**Average**	**50.0%**	**50.3%**
9	Min	49.1%	49.1%
10	Max	51.5%	52.0%
11	**Midpoint**	**50.3%**	**50.6%**

Source:

SNL Financial, downloaded on Dec 15, 2016.
*Includes through Sep. 30, 2016

As shown in Table 5 above, electric utility authorized capital structures have generally contained a common equity component of total capital of approximately 50%. Please note that Table 5 above reflects jurisdictions that do not include non-investor capital in the ratemaking capital structure. For example, some jurisdictions include accumulated deferred income taxes, customer deposits and other non-investor sources of capital in developing the overall rate of return. In Arizona, these components are reflected as rate base reductions. By recognizing jurisdictions that only reflect investor capital in developing the common equity ratio of total capital, it is clearly shown in Table 5 above that the industry average common equity ratio is generally approximately 50%.

Q WHY WOULD A CAPITAL STRUCTURE TOO HEAVILY WEIGHTED WITH COMMON EQUITY UNNECESSARILY INCREASE APS'S COST OF SERVICE IN THIS PROCEEDING?

A A capital structure too heavily weighted with common equity unnecessarily increases APS's claimed revenue deficiency because common equity is the most expensive form of capital and is subject to income tax expense. For example, if APS's authorized return on equity is set at 9.0%, the revenue requirement cost to customers would be approximately 14.4%, or 9.0% adjusted by a tax revenue conversion factor of approximately 1.6x. In contrast, the cost of debt capital is not subject to an income tax expense. APS's current marginal cost of debt is around 5.10%. Common equity is more than twice as expensive on a revenue requirement basis than debt capital.

A reasonable mix of debt and equity, as already approved by the Commission in the prior rate cases, is necessary in order to balance APS's financial risk, support an investment grade credit rating, and permit APS access to capital under reasonable terms and prices. However, a capital structure too heavily weighted with common equity will unnecessarily increase its cost of capital and revenue requirement for ratepayers.

Q WHAT CAPITAL STRUCTURE DO YOU RECOMMEND THE COMMISSION USE TO SET APS'S OVERALL RATE OF RETURN IN THIS PROCEEDING?

A For the reasons outlined above, I believe a ratemaking capital structure composed of 50% equity and 50% debt is sufficient to maintain APS's current investment grade bond ratings, while considering its off-balance sheet debt equivalents, but minimize its cost to retail customers to preserve this strong investment grade credit standing. Hence, my proposed capital structure will support APS's financial integrity but at a lower cost than that proposed by APS in its proposed capital structure. My recommended capital structure for setting rates in this proceeding is outlined in Table 6 below.

TABLE 6

Gorman Proposed
Ratemaking Capital Structure
(December 31, 2015)

Description	Weight
Long-Term Debt	50.00%
Common Equity	50.00%
Total	100.00%

Source: Exhibit MPG-4, page 2.

III.A. Embedded Cost of Debt

Q WHAT IS THE COMPANY'S EMBEDDED COST OF DEBT?

A Mr. Snook is proposing an embedded cost of debt of 5.13% as developed on Schedule D-2.

IV. RETURN ON EQUITY

Q PLEASE DESCRIBE WHAT IS MEANT BY A "UTILITY'S COST OF COMMON EQUITY."

A A utility's cost of common equity is the expected return that investors require on an investment in the utility. Investors expect to earn their required return from receiving dividends and through stock price appreciation.

Q PLEASE DESCRIBE THE FRAMEWORK FOR DETERMINING A REGULATED UTILITY'S COST OF COMMON EQUITY.

A In general, determining a fair cost of common equity for a regulated utility has been framed by two hallmark decisions of the U.S. Supreme Court: Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm'n of W. Va., 262 U.S. 679 (1923) and Fed. Power Comm'n v. Hope Natural Gas Co., 320 U.S. 591 (1944).

These decisions identify the general financial and economic standards to be considered in establishing the cost of common equity for a public utility. Those general standards provide that the authorized return should: (1) be sufficient to maintain financial integrity; (2) attract capital under reasonable terms; and (3) be commensurate with returns investors could earn by investing in other enterprises of comparable risk.

Q PLEASE DESCRIBE THE METHODS YOU HAVE USED TO ESTIMATE APS'S COST OF COMMON EQUITY.

A I have used several models based on financial theory to estimate APS's cost of common equity. These models are: (1) a constant growth Discounted Cash Flow ("DCF") model using consensus analysts' growth rate projections; (2) a constant growth DCF using sustainable growth rate estimates; (3) a multi-stage growth DCF model; (4) a Risk Premium model; and (5) a Capital Asset Pricing Model ("CAPM"). I have applied these models to a group of publicly traded utilities with investment risk similar to APS.

IV.A. Risk Proxy Group

Q PLEASE DESCRIBE HOW YOU IDENTIFIED A PROXY UTILITY GROUP THAT COULD BE USED TO REASONABLY REFLECT THE INVESTMENT RISK OF APS AND USED TO ESTIMATE ITS CURRENT MARKET COST OF EQUITY.

A I relied on the same proxy group developed by APS witness Dr. Villadsen with a few exceptions. I excluded Otter Tail because it did not have analysts' growth rates from Zacks, SNL Financial, or Reuters at the time I developed my studies. I also excluded Westar Energy and Great Plains Energy because they are in the process of merging, as announced on May 31, 2016. Similarly, I excluded Dominion Resources because in September 2016, it finalized its acquisition of Questar Corp. Finally, I excluded NextEra because it announced the purchase of Oncor Electric Delivery Company on July 29, 2016.

Q WHY IS IT IMPORTANT TO LIMIT THE PROXY GROUP COMPANIES TO THOSE THAT HAVE CONSENSUS ANALYSTS' GROWTH RATES PUBLISHED BY ZACKS, SNL FINANCIAL OR REUTERS?

A Selecting companies that have consensus analysts' growth rate projections from at least one of these three sources is an indication that market participants are following the security and there is adequate liquidity and market demand for the security to support the assumption that the market valuation of the security is based on fundamental valuation principles. A stock that is thinly traded, or is not widely followed by the market, may have an observable market price inconsistent with fundamental valuation principles.

Q WHY IS IT APPROPRIATE TO EXCLUDE COMPANIES WHICH ARE INVOLVED IN MERGER AND ACQUISITION ("M&A") ACTIVITY FROM THE PROXY GROUP?

A M&A activity can distort the market factors used in DCF and risk premium studies. M&A activity can have impacts on stock prices, growth outlooks, and relative volatility in historical stock prices if the market was anticipating or expecting the M&A activity prior to it actually being announced. This distortion in the market data thus impacts the reliability of the DCF and risk premium estimates for a company involved in M&A.

Moreover, companies generally enter into M&A in order to produce greater shareholder value by combining companies. The enhanced shareholder value normally could not be realized had the two companies not combined.

When companies announce an M&A, the public assesses the proposed merger and develops outlooks on the value of the two companies after the combination based on expected synergies or other value adds created by the M&A.

As a result, the stock value before the merger is completed may not reflect the forward-looking earnings and dividend payments for the company absent the merger or on a stand-alone basis. Therefore, an accurate DCF return estimate on companies involved in M&A activities cannot be produced because their stock prices do not reflect the stand-alone investment characteristics of the companies. Rather, the stock price more likely reflects the shareholder enhancement produced by the proposed transaction. For these reasons, it is appropriate to remove companies involved in M&A activity from a proxy group used to estimate a fair return on equity for a utility.

Q PLEASE DESCRIBE WHY YOU BELIEVE YOUR PROXY GROUP IS REASONABLY COMPARABLE IN INVESTMENT RISK TO APS.

A The proxy group is shown in Exhibit MPG-5. The proxy group has an average corporate credit rating from S&P of BBB+, which is slightly lower than S&P's corporate credit rating for APS of A-. The proxy group has an average corporate credit rating from Moody's of Baa1, which is also a notch lower than APS's corporate credit rating from Moody's of A2. Based on this information, I believe my proxy group has slightly higher but reasonably comparable investment risk to APS. Therefore, the return on equity produced by my proxy group is conservative.

The proxy group has an average common equity ratio of 46.4% (including short-term debt) from SNL Financial ("SNL") and 48.7% (excluding short-term debt) from *The Value Line Investment Survey* ("*Value Line*") in 2015.

The Company's proposed common equity ratio of 55.8% is significantly higher than the proxy group common equity ratio, which means that my proxy group has higher financial risk and will produce a conservative return on equity for APS. Similarly, my proposed common equity ratio is also higher than the average proxy group common equity ratio. Based on these risk factors, I conclude the proxy group reasonably approximates the investment risk of APS and produces a conservative return on equity estimate for APS.

IV.B. Discounted Cash Flow Model

Q PLEASE DESCRIBE THE DCF MODEL.

A The DCF model posits that a stock price is valued by summing the present value of expected future cash flows discounted at the investor's required rate of return or cost of capital. This model is expressed mathematically as follows:

$$P_0 = \frac{D_1}{(1+K)^1} + \frac{D_2}{(1+K)^2} \ldots \frac{D_\infty}{(1+K)^\infty} \qquad \text{(Equation 1)}$$

P_0 = Current stock price
D = Dividends in periods 1 - ∞
K = Investor's required return

This model can be rearranged in order to estimate the discount rate or investor-required return otherwise known as "K." If it is reasonable to assume that earnings and dividends will grow at a constant rate, then Equation 1 can be rearranged as follows:

$$K = D_1/P_0 + G \qquad \text{(Equation 2)}$$

K = Investor's required return
D_1 = Dividend in first year
P_0 = Current stock price
G = Expected constant dividend growth rate

Equation 2 is referred to as the annual "constant growth" DCF model.

Q PLEASE DESCRIBE THE INPUTS TO YOUR CONSTANT GROWTH DCF MODEL.

A As shown in Equation 2 above, the DCF model requires a current stock price, expected dividend, and expected growth rate in dividends.

Q WHAT STOCK PRICE HAVE YOU RELIED ON IN YOUR CONSTANT GROWTH DCF MODEL?

A I relied on the average of the weekly high and low stock prices of the utilities in the proxy group over a 13-week period ending on November 18, 2016. An average stock price is less susceptible to market price variations than a price at a single point in time. Therefore, an average stock price is less susceptible to aberrant market price movements, which may not reflect the stock's long-term value.

A 13-week average stock price reflects a period that is still short enough to contain data that reasonably reflects current market expectations but the period is not so short as to be susceptible to market price variations that may not reflect the stock's long-term value. In my judgment, a 13-week average stock price is a reasonable balance between the need to reflect current market expectations and the need to capture sufficient data to smooth out aberrant market movements.

Q WHAT DIVIDEND DID YOU USE IN YOUR CONSTANT GROWTH DCF MODEL?

A I used the most recently paid quarterly dividend as reported in *Value Line*.[14] This dividend was annualized (multiplied by 4) and adjusted for next year's growth to produce the D1 factor for use in Equation 2 above.

Q WHAT DIVIDEND GROWTH RATES HAVE YOU USED IN YOUR CONSTANT GROWTH DCF MODEL?

A There are several methods that can be used to estimate the expected growth in dividends. However, regardless of the method, for purposes of determining the market-required return on common equity, one must attempt to estimate investors' consensus about what the dividend, or earnings growth rate, will be, and not what an individual investor or analyst may use to make individual investment decisions.

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[14] *The Value Line Investment Survey*, September 16, October 28, and November 18, 2016.

As predictors of future returns, security analysts' growth estimates have been shown to be more accurate than growth rates derived from historical data.[15] That is, assuming the market generally makes rational investment decisions, analysts' growth projections are more likely to influence investors' decisions which are captured in observable stock prices than growth rates derived only from historical data.

For my constant growth DCF analysis, I have relied on a consensus, or mean, of professional security analysts' earnings growth estimates as a proxy for investor consensus dividend growth rate expectations. I used the average of analysts' growth rate estimates from three sources: Zacks, SNL, and Reuters. All such projections were available on November 18, 2016, and all were reported online.

Each consensus growth rate projection is based on a survey of security analysts. There is no clear evidence whether a particular analyst is most influential on general market investors. Therefore, a single analyst's projection does not as reliably predict consensus investor outlooks as does a consensus of market analysts' projections. The consensus estimate is a simple arithmetic average, or mean, of surveyed analysts' earnings growth forecasts. A simple average of the growth forecasts gives equal weight to all surveyed analysts' projections. Therefore, a simple average, or arithmetic mean, of analyst forecasts is a good proxy for market consensus expectations.

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[15] *See, e.g.,* David Gordon, Myron Gordon, and Lawrence Gould, "Choice Among Methods of Estimating Share Yield," *The Journal of Portfolio Management*, Spring 1989.

Q WHAT ARE THE GROWTH RATES YOU USED IN YOUR CONSTANT GROWTH DCF MODEL?

A The growth rates I used in my DCF analysis are shown in Exhibit MPG-6. The average growth rate for my proxy group is 5.18%.

Q WHAT ARE THE RESULTS OF YOUR CONSTANT GROWTH DCF MODEL?

A As shown in Exhibit MPG-7, the average and median constant growth DCF returns for my proxy group for the 13-week analysis are 8.65% and 8.75%, respectively.

Q DO YOU HAVE ANY COMMENTS ON THE RESULTS OF YOUR CONSTANT GROWTH DCF ANALYSIS?

A Yes. The constant growth DCF analysis for my proxy group is based on a group average long-term sustainable growth rate of 5.18%. The three- to five-year growth rates are higher than my estimate of a maximum long-term sustainable growth rate of 4.25%, which I discuss later in this testimony. I believe the constant growth DCF analysis produces a reasonable high-end return estimate.

Q HOW DID YOU ESTIMATE A MAXIMUM LONG-TERM SUSTAINABLE GROWTH RATE?

A A long-term sustainable growth rate for a utility stock cannot exceed the growth rate of the economy in which it sells its goods and services. Hence, the long-term maximum sustainable growth rate for a utility investment is best proxied by the projected long-term Gross Domestic Product ("GDP"). *Blue Chip Financial Forecasts* projects that over the next 5 and 10 years, the U.S. nominal GDP will grow approximately 4.20%. These GDP growth projections reflect a real growth outlook of around 2.2% and an inflation outlook of around 2.0% going forward. As such, the average growth rate over the next 10 years is around 4.25%, which I believe is a reasonable proxy of long-term sustainable growth.[16]

In my multi-stage growth DCF analysis, I discuss academic and investment practitioner support for using the projected long-term GDP growth outlook as a maximum sustainable growth rate projection. Hence, recognizing the long-term GDP growth rate as a maximum sustainable growth is logical, and is generally consistent with academic and economic practitioner accepted practices.

IV.C. Sustainable Growth DCF

Q PLEASE DESCRIBE HOW YOU ESTIMATED A SUSTAINABLE LONG-TERM GROWTH RATE FOR YOUR SUSTAINABLE GROWTH DCF MODEL.

A A sustainable growth rate is based on the percentage of the utility's earnings that is retained and reinvested in utility plant and equipment. These reinvested earnings increase the earnings base (rate base). Earnings grow when plant funded by reinvested earnings is put into service, and the utility is allowed to earn its authorized return on such additional rate base investment.

The internal growth methodology is tied to the percentage of earnings retained in the company and not paid out as dividends. The earnings retention ratio is 1 minus the dividend payout ratio. As the payout ratio declines, the earnings retention ratio increases. An increased earnings retention ratio will fuel stronger growth because the business funds more investments with retained earnings.

The payout ratios of the proxy group are shown in my Exhibit MPG-8. These dividend payout ratios and earnings retention ratios then can be used to develop a sustainable long-term earnings retention growth rate. A sustainable long-term earnings retention ratio will help gauge whether analysts' current three- to five-year growth rate projections can be sustained over an indefinite period of time.

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[16] *Blue Chip Financial Forecasts*, December 1, 2016, at 12.

The data used to estimate the long-term sustainable growth rate is based on the Company's current market-to-book ratio and on *Value Line*'s three- to five-year projections of earnings, dividends, earned returns on book equity, and stock issuances.

As shown in Exhibit MPG-9, the average sustainable growth rate for the proxy group using this internal growth rate model is 4.43%.

Q WHAT IS THE DCF ESTIMATE USING THESE SUSTAINABLE LONG-TERM GROWTH RATES?

A A DCF estimate based on these sustainable growth rates is developed in Exhibit MPG-10. As shown there, a sustainable growth DCF analysis produces proxy group average and median DCF results for the 13-week period of 7.94% and 7.69%, respectively.

IV.D. Multi-Stage Growth DCF Model

Q HAVE YOU CONDUCTED ANY OTHER DCF STUDIES?

A Yes. My first constant growth DCF is based on consensus analysts' growth rate projections so it is a reasonable reflection of rational investment expectations over the next three to five years. The limitation on this constant growth DCF model is that it cannot reflect a rational expectation that a period of high or low short-term growth can be followed by a change in growth to a rate that is more reflective of long-term sustainable growth. Hence, I performed a multi-stage growth DCF analysis to reflect this outlook of changing growth expectations.

Q WHY DO YOU BELIEVE GROWTH RATES CAN CHANGE OVER TIME?

A Analyst-projected growth rates over the next three to five years will change as utility earnings growth outlooks change. Utility companies go through cycles in making investments in their systems. When utility companies are making large investments, their rate base grows rapidly, which in turn accelerates earnings growth. Once a major construction cycle is completed or levels off, growth in the utility rate base slows and its earnings growth slows from an abnormally high three- to five-year rate to a lower sustainable growth rate.

As major construction cycles extend over longer periods of time, even with an accelerated construction program, the growth rate of the utility will slow simply because rate base growth will slow and the utility has limited human and capital resources available to expand its construction program. Therefore, the three- to five-year growth rate projection should be used as a long-term sustainable growth rate, but not without making a reasonable informed judgment to determine whether it considers the current market environment, the industry, and whether the three- to five-year growth outlook is sustainable.

Q PLEASE DESCRIBE YOUR MULTI-STAGE GROWTH DCF MODEL.

A The multi-stage growth DCF model reflects the possibility of non-constant growth for a company over time. The multi-stage growth DCF model reflects three growth periods: (1) a short-term growth period consisting of the first five years; (2) a transition period, consisting of the next five years (6 through 10); and (3) a long-term growth period starting in year 11 through perpetuity.

For the short-term growth period, I relied on the consensus analysts' growth projections described above in relationship to my constant growth DCF model. For the transition period, the growth rates were reduced or increased by an equal factor reflecting the difference between the analysts' growth rates and the long-term sustainable growth rate. For the long-term growth period, I assumed each company's growth would converge to the maximum sustainable long-term growth rate.

Q WHY IS THE GDP GROWTH PROJECTION A REASONABLE PROXY FOR THE MAXIMUM SUSTAINABLE LONG-TERM GROWTH RATE?

A Utilities cannot indefinitely sustain a growth rate that exceeds the growth rate of the economy in which they sell services. Utilities' earnings/dividend growth is created by increased utility investment or rate base. Such investment, in turn, is driven by service area economic growth and demand for utility service. In other words, utilities invest in plant to meet sales demand growth. Sales growth, in turn, is tied to economic growth in their service areas.

The U.S. Department of Energy, Energy Information Administration ("EIA") has observed utility sales growth tracks the U.S. GDP growth, albeit at a lower level, as shown in Exhibit MPG-11. Utility sales growth has lagged behind GDP growth for more than a decade. As a result, nominal GDP growth is a very conservative proxy for utility sales growth, rate base growth, and earnings growth. Therefore, the U.S. GDP nominal growth rate is a conservative proxy for the highest sustainable long-term growth rate of a utility.

Q IS THERE RESEARCH THAT SUPPORTS YOUR POSITION THAT, OVER THE LONG TERM, A COMPANY'S EARNINGS AND DIVIDENDS CANNOT GROW AT A RATE GREATER THAN THE GROWTH OF THE U.S. GDP?

A Yes. This concept is supported in published analyst literature and academic work. Specifically, in a textbook titled "Fundamentals of Financial Management," published by Eugene Brigham and Joel F. Houston, the authors state as follows:

> The constant growth model is most appropriate for mature companies with a stable history of growth and stable future expectations. Expected growth rates vary somewhat among companies, but dividends for mature firms are often expected to grow in the future at about the same rate as nominal gross domestic product (real GDP plus inflation).[17]

The use of the economic growth rate is also supported by investment practitioners:

> **Estimating Growth Rates**
>
> One of the advantages of a three-stage discounted cash flow model is that it fits with life cycle theories in regards to company growth. In these theories, companies are assumed to have a life cycle with varying growth characteristics. Typically, the potential for extraordinary growth in the near term eases over time and eventually growth slows to a more stable level.
>
> * * *
>
> Another approach to estimating long-term growth rates is to focus on estimating the overall economic growth rate. Again, this is the approach used in the *Ibbotson Cost of Capital Yearbook*. To obtain the economic growth rate, a forecast is made of the growth rate's component parts. Expected growth can be broken into two main parts: expected inflation and expected real growth. By analyzing these components separately, it is easier to see the factors that drive growth.[18]

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[17] *"Fundamentals of Financial Management,"* Eugene F. Brigham and Joel F. Houston, Eleventh Edition 2007, Thomson South-Western, a Division of Thomson Corporation at 298, emphasis added.

[18] *Morningstar, Inc., Ibbotson SBBI 2013 Valuation Yearbook* at 51 and 52.

Q IS THERE ANY ACTUAL INVESTMENT HISTORY THAT SUPPORTS THE NOTION THAT THE CAPITAL APPRECIATION FOR STOCK INVESTMENTS WILL NOT EXCEED THE NOMINAL GROWTH OF THE U.S. GDP?

A Yes. This is evident by a comparison of the compound annual growth of the U.S. GDP compared to the geometric growth of the U.S. stock market. Morningstar measures the historical geometric growth of the U.S. stock market over the period 1926-2015 to be approximately 5.8%. During this same time period, the U.S. nominal compound annual growth of the U.S. GDP was approximately 6.2%.[19]

As such, the compound geometric growth of the U.S. nominal GDP has been higher but comparable to the nominal growth of the U.S. stock market capital appreciation. This historical relationship indicates that the U.S. GDP growth outlook is a conservative estimate of the long-term sustainable growth of U.S. stock investments.

Q HOW DID YOU DETERMINE A SUSTAINABLE LONG-TERM GROWTH RATE THAT REFLECTS THE CURRENT CONSENSUS OUTLOOK OF THE MARKET?

A I relied on the consensus analysts' projections of long-term GDP growth. *Blue Chip Financial Forecasts* publishes consensus economists' GDP growth projections twice a year. These consensus analysts' GDP growth outlooks are the best available measure of the market's assessment of long-term GDP growth. These analyst projections reflect all current outlooks for GDP and are likely the most influential on investors' expectations of future growth outlooks. The consensus economists' published GDP growth rate outlook is 4.25% over the next 10 years.[20]

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[19] *Duff & Phelps 2016 Valuation Handbook* inflation rate of 2.9% at 2-4, and U.S. Bureau of Economic Analysis, January 29, 2016.

[20] *Blue Chip Financial Forecasts, December 1, 2016, at 12.*

Therefore, I propose to use the consensus economists' projected 5- and 10-year average GDP consensus growth rates of 4.25%, as published by *Blue Chip Financial Forecasts*, as an estimate of long-term sustainable growth. *Blue Chip Financial Forecasts* projections provide real GDP growth projections of 2.2% and GDP inflation of 2.0%[21] over the 5-year and 10-year projection periods. These consensus GDP growth forecasts represent the most likely views of market participants because they are based on published consensus economist projections.

Q DO YOU CONSIDER OTHER SOURCES OF PROJECTED LONG-TERM GDP GROWTH?

A Yes, and these sources corroborate my consensus analysts' projections, as shown below in Table 7.

TABLE 7

GDP Forecasts

Source	Term	Real GDP	Inflation	Nominal GDP
Blue Chip Financial Forecasts	5-10 Yrs	2.2%	2.0%	4.25%
EIA – Annual Earnings Outlook	25 Yrs	2.2%	2.1%	4.4%
Congressional Budget Office	10 Yrs	2.0%	2.0%	4.0%
Moody's Analytics	30 Yrs	2.0%	2.0%	4.1%
Social Security Administration	50 Yrs			4.4%
The Economist Intelligence Unit	35 Yrs	1.9%	2.0%	3.9%

The EIA in its *Annual Energy Outlook* projects real GDP out until 2040. In its 2016 Annual Report, the EIA projects real GDP through 2040 to be 2.2% and a long-term GDP price inflation projection of 2.1%. The EIA data supports a long-term nominal GDP growth outlook of 4.4%.[22]

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[21] *Id.*

Also, the Congressional Budget Office ("CBO") makes long-term economic projections. The CBO is projecting real GDP growth to be 2.0% during the next 10 years with a GDP price inflation outlook of 2.0%.[23] The CBO 10-year outlook for nominal GDP based on this projection is 4.0%.

Moody's Analytics also makes long-term economic projections. In its recent 30-year outlook to 2045, Moody's Analytics is projecting real GDP growth of 2.0% with GDP inflation of 2.0%.[24] Based on these projections, Moody's is projecting nominal GDP growth of 4.1% over the next 30 years.

The Social Security Administration ("SSA") makes long-term economic projections out to 2090. The SSA's nominal GDP projection, under its intermediate cost scenario of 50 years, is 4.4%.[25] The Economist Intelligence Unit, a division of *The Economist* and a third-party data provider to SNL Financial, makes a long-term economic projection out to 2050.[26] The Economist Intelligence Unit is projecting real GDP growth of 1.9% with an inflation rate of 2.0% out to 2050. The real GDP growth projection is in line with the consensus economists. The long-term nominal GDP projection based on these outlooks is approximately 3.9%.

The real GDP and nominal GDP growth projections made by these independent sources support the use of the consensus economist 5-year and 10-year projected GDP growth outlooks as a reasonable estimate of market participants' long-term GDP growth outlooks.

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[22] DOE/EIA Annual Energy Outlook 2016 With Projections to 2040, May 2016, Table 20.
[23] *CBO: The Budget and Economic Outlook: 2016 to 2026*, January 2016, at 140.
[24] www.economy.com, *Moody's Analytics Forecast*, January 6, 2016.
[25] www.ssa.gov, "2016 OASDI Trustees Report," Table VI.G4.
[26] *SNL Financial, Economist Intelligence Unit*, downloaded on January 13, 2016.

Q WHAT STOCK PRICE, DIVIDEND, AND GROWTH RATES DID YOU USE IN YOUR MULTI-STAGE GROWTH DCF ANALYSIS?

A I relied on the same 13-week average stock prices and the most recent quarterly dividend payment data discussed above. For stage one growth, I used the consensus analysts' growth rate projections discussed above in my constant growth DCF model. The first stage growth covers the first five years, consistent with the term of the analyst growth rate projections. The second stage, or transition stage, begins in year 6 and extends through year 10. The second stage growth transitions the growth rate from the first stage to the third stage using a linear trend. For the third stage, or long-term sustainable growth stage, starting in year 11, I used a 4.25% long-term sustainable growth rate based on the consensus economists' long-term projected nominal GDP growth rate.

Q WHAT ARE THE RESULTS OF YOUR MULTI-STAGE GROWTH DCF MODEL?

A As shown in Exhibit MPG-12, the average and median DCF returns on equity for my proxy group using the 13-week average stock price are both 7.90%.

Q PLEASE SUMMARIZE THE RESULTS FROM YOUR DCF ANALYSES.

A The results from my DCF analyses are summarized in Table 8 below:

TABLE 8

Summary of DCF Results

Description	Proxy Group Average	Proxy Group Median
Constant Growth DCF Model (Analysts' Growth)	8.65%	8.75%
Constant Growth DCF Model (Sustainable Growth)	7.94%	7.69%
Multi-Stage Growth DCF Model	7.90%	7.90%

I conclude that my DCF studies support a return on equity of 8.8%, primarily based on my constant growth DCF (analysts' growth) result, which I find as a reasonable high-end DCF return estimate.

IV.E. Risk Premium Model

Q PLEASE DESCRIBE YOUR BOND YIELD PLUS RISK PREMIUM MODEL.

A This model is based on the principle investors require a higher return to assume greater risk. Common equity investments have greater risk than bonds because bonds have more security of payment in bankruptcy proceedings than common equity and the coupon payments on bonds represent contractual obligations. In contrast, companies are not required to pay dividends or guarantee returns on common equity investments. Therefore, common equity securities are considered to be riskier than bond securities.

This risk premium model is based on two estimates of an equity risk premium. First, I estimated the difference between the required return on utility common equity investments and U.S. Treasury bonds. The difference between the required return on common equity and the Treasury bond yield is the risk premium. I estimated the risk premium on an annual basis for each year over the period January 1986 through

September 2016. The common equity required returns were based on regulatory commission-authorized returns for electric utility companies. Authorized returns are typically based on expert witnesses' estimates of the contemporary investor-required return.

The second equity risk premium estimate is based on the difference between regulatory commission-authorized returns on common equity and contemporary "A" rated utility bond yields by Moody's. I selected the period January 1986 through September 2016 because public utility stocks consistently traded at a premium to book value during that period. This is illustrated in Exhibit MPG-13, which shows the market-to-book ratio since 1986 for the electric utility industry was consistently above a multiple of 1.0x. Over this period, regulatory authorized returns were sufficient to support market prices that at least exceeded book value. This is an indication that regulatory authorized returns on common equity supported a utility's ability to issue additional common stock without diluting existing shares. It further demonstrates utilities were able to access equity markets without a detrimental impact on current shareholders.

Based on this analysis, as shown in Exhibit MPG-14, the average indicated equity risk premium over U.S. Treasury bond yields has been 5.47%. Since the risk premium can vary depending upon market conditions and changing investor risk perceptions, I believe using an estimated range of risk premiums provides the best method to measure the current return on common equity for a risk premium methodology.

I incorporated five-year and 10-year rolling average risk premiums over the study period to gauge the variability over time of risk premiums. These rolling average risk premiums mitigate the impact of anomalous market conditions and skewed risk premiums over an entire business cycle. As shown on my Exhibit MPG-14, the five-year rolling average risk premium over Treasury bonds ranged from 4.25% to 6.75%, while the 10-year rolling average risk premium ranged from 4.38% to 6.41%.

As shown on my Exhibit MPG-15, the average indicated equity risk premium over contemporary Moody's utility bond yields was 4.09%. The five-year and 10-year rolling average risk premiums ranged from 2.88% to 5.58% and 3.20% to 5.05%, respectively.

Q DO YOU BELIEVE THAT THE TIME PERIOD USED TO DERIVE THESE EQUITY RISK PREMIUM ESTIMATES IS APPROPRIATE TO FORM ACCURATE CONCLUSIONS ABOUT CONTEMPORARY MARKET CONDITIONS?

A Yes. The time period I use in this risk premium study is a generally accepted period to develop a risk premium study using "expectational" data.

Contemporary market conditions can change dramatically during the period that rates determined in this proceeding will be in effect. A relatively long period of time where stock valuations reflect premiums to book value is an indication the authorized returns on equity and the corresponding equity risk premiums were supportive of investors' return expectations and provided utilities access to the equity markets under reasonable terms and conditions. Further, this time period is long enough to smooth abnormal market movement that might distort equity risk premiums. While market conditions and risk premiums do vary over time, this historical time period is a reasonable period to estimate contemporary risk premiums.

Alternatively, some studies, such as Duff & Phelps referred to later in this testimony, have recommended that use of "actual achieved investment return data" in a risk premium study should be based on long historical time periods. The studies find that achieved returns over short time periods may not reflect investors' expected returns due to unexpected and abnormal stock price performance. Short-term, abnormal actual returns would be smoothed over time and the achieved actual investment returns over long time periods would approximate investors' expected returns. Therefore, it is reasonable to assume that averages of annual achieved returns over long time periods will generally converge on the investors' expected returns.

My risk premium study is based on expectational data, not actual investment returns, and, thus, need not encompass a very long historical time period.

Q BASED ON HISTORICAL DATA, WHAT RISK PREMIUM HAVE YOU USED TO ESTIMATE APS'S COST OF COMMON EQUITY IN THIS PROCEEDING?

A The equity risk premium should reflect the relative market perception of risk in the utility industry today. I have gauged investor perceptions in utility risk today in Exhibit MPG-16, where I show the yield spread between utility bonds and Treasury bonds over the last 36 years. As shown in this schedule, the average utility bond yield spreads over Treasury bonds for "A" and "Baa" rated utility bonds for this historical period are 1.52% and 1.96%, respectively. The utility bond yield spreads over Treasury bonds for "A" and "Baa" rated utilities for 2016 were 1.37% and 2.18%, respectively. The current average "A" rated utility bond yield spread over Treasury bond yields is now lower than the 36-year average spread. The current "Baa" rated utility bond yield spread over Treasury bond yields is higher than the 36-year average spread.

A current 13-week average "A" rated utility bond yield of 3.79% when compared to the current Treasury bond yield of 2.51% as shown in Exhibit MPG-17, page 1, implies a yield spread of around 128 basis points. This current utility bond yield spread is lower than the 36-year average spread for "A" rated utility bonds of 1.52%. The current spread for the "Baa" rated utility bond yield of 1.87% is also lower than the 36-year average spread of 1.96%. Further, when compared to the projected Treasury bond yield of 3.10%, the current "Baa" utility spread is around 1.28%, lower than the 36-year average of 1.96%.

These utility bond yield spreads are evidence that the market perception of utility risk is about average relative to this historical time period and demonstrate that utilities continue to have strong access to capital in the current market.

Q HOW DO YOU DETERMINE WHERE A REASONABLE RISK PREMIUM IS IN THE CURRENT MARKET?

A I observed the spread of Treasury securities relative to public utility bonds and corporate bonds in gauging whether or not the risk premium in current market prices is relatively stable relative to the past. What this observation of market evidence clearly provides is that the valuations in the current market place an above average risk premium on securities that have greater risk.

This market evidence is summarized below in Table 9, which shows the utility bond yield spreads over Treasury bond yields on average for the period 1980 through the first three quarters of 2016. I also show the corporate bond yield spreads for Aaa corporates and Baa corporates.

TABLE 9

Comparison of Yield Spreads Over Treasury Bonds

Description	Utility		Corporate	
	A	Baa	Aaa	Baa
Average Historical Spread	1.52%	1.96%	0.84%	1.95%
Q3, 2016 Spread	1.37%	2.18%	1.10%	2.46%

Source: Exhibit MPG-16.

The observable yield spreads shown in the table above illustrate that securities of greater risk have above average risk premiums relative to the long-term historical average risk premium. Specifically, A-rated utility bonds to Treasuries, a relatively low-risk investment, have a yield spread in 2016 that has been very comparable to that of its long-term historical yield spread. The A utility bond yield spread is actually below the yield spread over the last 36 years. This is an indication that low risk investments like Aaa corporate bond yield and A-rated utility bond yield have premium values relative to minimal risk Treasury securities.

In contrast, the higher risk Baa utility and corporate bond yields currently have an above-average yield spread of approximately 20 basis points (2.18% vs. 1.96%). The higher risk Baa utility bond yields do not have the same premium valuations as their lower risk A-rated utility bond yields, and thus the yield spread for greater risk investments is wider than lower risk investments.

This illustrates that securities with greater risk such as Baa yields versus A yields are commanding above average risk premiums in the current marketplace. Utility equity securities are greater risk than Baa utility bonds. Because greater risk securities appear to support an above-average risk premium relative to historical averages, this would support an above-average risk premium in measuring a fair return on equity for a utility or equity security.

Q WHAT IS YOUR RECOMMENDED RETURN FOR APS BASED ON YOUR RISK PREMIUM STUDY?

A To be conservative, I am recommending more weight to the high-end risk premium estimates than the low-end. I state this because of the relatively low level of interest rates now but relative upward movements of utility yields more recently. Hence, I propose to provide 75% weight to my high-end risk premium estimates and 25% to the low-end. Applying these weights, the risk premium for Treasury bond yields would be approximately 6.13%,[27] which is considerably higher than the 31-year average risk premium of 5.47% and reasonably reflective of the 3.1% projected Treasury bond yield. A Treasury bond risk premium of 6.13% and projected Treasury bond yield of 3.1% produce a risk premium estimate of 9.23%, rounded to 9.25%. Similarly, applying these weights to the utility risk premium indicates a risk premium of 4.91%.[28] This risk premium is above the 31-year historical average risk premium of 4.09%. This risk premium in connection with the current Baa observable utility bond yield of 4.38% produces an estimated return on equity of approximately 9.31%.

Based on this methodology, both my Treasury bond risk premium and my utility bond risk premium indicate a return on equity in the range of 9.23% to 9.31% with a midpoint of 9.27%, rounded to 9.30%.

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[27] (4.25% * 25%) + (6.75% * 75%) = 6.13%.

[28] (2.88% * 25%) + (5.58% * 75%) = 4.91%.

IV.F. Capital Asset Pricing Model ("CAPM")

Q PLEASE DESCRIBE THE CAPM.

A The CAPM method of analysis is based upon the theory that the market-required rate of return for a security is equal to the risk-free rate, plus a risk premium associated with the specific security. This relationship between risk and return can be expressed mathematically as follows:

$R_i = R_f + B_i \times (R_m - R_f)$ where:

R_i = Required return for stock i
R_f = Risk-free rate
R_m = Expected return for the market portfolio
B_i= Beta - Measure of the risk for stock

The stock-specific risk term in the above equation is beta. Beta represents the investment risk that cannot be diversified away when the security is held in a diversified portfolio. When stocks are held in a diversified portfolio, firm-specific risks can be eliminated by balancing the portfolio with securities that react in the opposite direction to firm-specific risk factors (e.g., business cycle, competition, product mix, and production limitations).

The risks that cannot be eliminated when held in a diversified portfolio are non-diversifiable risks. Non-diversifiable risks are related to the market in general and referred to as systematic risks. Risks that can be eliminated by diversification are non-systematic risks. In a broad sense, systematic risks are market risks and non-systematic risks are business risks. The CAPM theory suggests the market will not compensate investors for assuming risks that can be diversified away. Therefore, the only risk investors will be compensated for are systematic or non-diversifiable risks. The beta is a measure of the systematic or non-diversifiable risks.

Q PLEASE DESCRIBE THE INPUTS TO YOUR CAPM.

A The CAPM requires an estimate of the market risk-free rate, the Company's beta, and the market risk premium.

Q WHAT DID YOU USE AS AN ESTIMATE OF THE MARKET RISK-FREE RATE?

A As previously noted, *Blue Chip Financial Forecasts*' projected 30-year Treasury bond yield is 3.40%.[29] The current 30-year Treasury bond yield is 2.51%, as shown in Exhibit MPG-17. I used *Blue Chip Financial Forecasts*' projected 30-year Treasury bond yield of 3.40% for my CAPM analysis.

Q WHY DID YOU USE LONG-TERM TREASURY BOND YIELDS AS AN ESTIMATE OF THE RISK-FREE RATE?

A Treasury securities are backed by the full faith and credit of the United States government so long-term Treasury bonds are considered to have negligible credit risk. Also, long-term Treasury bonds have an investment horizon similar to that of common stock. As a result, investor-anticipated long-run inflation expectations are reflected in both common stock required returns and long-term bond yields. Therefore, the nominal risk-free rate (or expected inflation rate and real risk-free rate) included in a long-term bond yield is a reasonable estimate of the nominal risk-free rate included in common stock returns.

Treasury bond yields, however, do include risk premiums related to unanticipated future inflation and interest rates. A Treasury bond yield is not a risk-free rate. Risk premiums related to unanticipated inflation and interest rates are systematic of market risks. Consequently, for companies with betas less than 1.0, using the Treasury bond yield as a proxy for the risk-free rate in the CAPM analysis can produce an overstated estimate of the CAPM return.

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[29] *Blue Chip Financial Forecasts*, December 1, 2016 at 2.

Q WHAT BETA DID YOU USE IN YOUR ANALYSIS?

A As shown in Exhibit MPG-18, the proxy group average Value Line beta estimate is 0.70.

Q HOW DID YOU DERIVE YOUR MARKET RISK PREMIUM ESTIMATE?

A I derived two market risk premium estimates: a forward-looking estimate and one based on a long-term historical average.

The forward-looking estimate was derived by estimating the expected return on the market (as represented by the S&P 500) and subtracting the risk-free rate from this estimate. I estimated the expected return on the S&P 500 by adding an expected inflation rate to the long-term historical arithmetic average real return on the market. The real return on the market represents the achieved return above the rate of inflation.

Duff & Phelps' *2016 Valuation Handbook* estimates the historical arithmetic average real market return over the period 1926 to 2015 as 8.7%.[30] A current consensus analysts' inflation projection, as measured by the Consumer Price Index, is 2.3%.[31] Using these estimates, the expected market return is 11.20%.[32] The market risk premium then is the difference between the 11.20% expected market return and my 3.40% risk-free rate estimate, or approximately 7.80%.

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[30] *Duff & Phelps, 2016 Valuation Handbook: Guide to Cost of Capital* at 2-4. Calculated as [(1+0.12) / (1+0.03)] – 1.

[31] *Blue Chip Financial Forecasts*, December 1, 2016 at 2.

[32] { [(1 + 0.087) * (1 + 0.023)] – 1 } * 100.

My historical estimate of the market risk premium was also calculated by using data provided by Duff & Phelps in its *2016 Valuation Handbook*. Over the period 1926 through 2015, the Duff & Phelps study estimated that the arithmetic average of the achieved total return on the S&P 500 was 12.0%[33] and the total return on long-term Treasury bonds was 6.00%.[34] The indicated market risk premium is 6.0% (12.0% - 6.0% = 6.0%).

Q HOW DOES YOUR ESTIMATED MARKET RISK PREMIUM RANGE COMPARE TO THAT ESTIMATED BY DUFF & PHELPS?

A The Duff & Phelps analysis indicates a market risk premium falls somewhere in the range of 5.5% to 6.9%. My market risk premium falls in the range of 6.0% to 7.8%. My average market risk premium of 6.9% is at the high-end of the Duff & Phelps range.

Q HOW DOES DUFF & PHELPS MEASURE A MARKET RISK PREMIUM?

A Duff & Phelps makes several estimates of a forward-looking market risk premium based on actual achieved data from the historical period of 1926 through 2015 as well as normalized data. Using this data, Duff & Phelps estimates a market risk premium derived from the total return on large company stocks (S&P 500), less the income return on Treasury bonds. The total return includes capital appreciation, dividend or coupon reinvestment returns, and annual yields received from coupons and/or dividend payments. The income return, in contrast, only reflects the income return received from dividend payments or coupon yields. Duff & Phelps claims the income return is the only true risk-free rate associated with Treasury bonds and is the best approximation of a truly risk-free rate.[35] I disagree with this assessment from Duff & Phelps because it does not reflect a true investment option available to the marketplace and therefore does not produce a legitimate estimate of the expected premium of investing in the stock market versus that of Treasury bonds. Nevertheless, I will use Duff & Phelps' conclusion to show the reasonableness of my market risk premium estimates.

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[33] *Duff & Phelps, 2016 Valuation Handbook: Guide to Cost of Capital* at 2-4.
[34] *Id.*

Duff & Phelps' range is based on several methodologies. First, Duff & Phelps estimates a market risk premium of 6.9% based on the difference between the total market return on common stocks (S&P 500) less the income return on Treasury bond investments over the 1926-2015 period.

Second, Duff & Phelps updated the Ibbotson & Chen supply-side model which found that the 6.9% market risk premium based on the S&P 500 was influenced by an abnormal expansion of price-to-earnings ("P/E") ratios relative to earnings and dividend growth during the period, primarily over the last 25 years. Duff & Phelps believes this abnormal P/E expansion is not sustainable.[36] Therefore, Duff & Phelps adjusted this market risk premium estimate to normalize the growth in the P/E ratio to be more in line with the growth in dividends and earnings. Based on this alternative methodology, Duff & Phelps published a long-horizon supply-side market risk premium of 6.03%.[37]

Finally, Duff & Phelps developed its own recommended equity, or market, risk premium by employing an analysis that considered a wide range of economic information, multiple risk premium estimation methodologies, and the current state of the economy by observing measures such as the level of stock indices and corporate spreads as indicators of perceived risk. Based on this methodology, and utilizing a

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[35] *Id.* at 3-28.
[36] *Id.* at 3-30.
[37] *Id.* at 3-31.

"normalized" risk-free rate of 4.0%, Duff & Phelps concluded that the current expected, or forward-looking, market risk premium is 5.5%, implying an expected return on the market of 9.5%.[38]

Q WHAT ARE THE RESULTS OF YOUR CAPM ANALYSIS?

A As shown in Exhibit MPG-19, based on my low market risk premium of 6.0% and my high market risk premium of 7.8%, a risk-free rate of 3.40%, and a beta of 0.74, my CAPM analysis produces a return of 7.63% to 8.90%. Based on my assessment of risk premiums in the current market, as discussed above, I recommend my high-end CAPM return estimate of 8.90%. This CAPM most closely aligns the market risk premium with the current risk-free rate.

IV.G. Return on Equity Summary

Q BASED ON THE RESULTS OF YOUR RETURN ON COMMON EQUITY ANALYSES DESCRIBED ABOVE, WHAT RETURN ON COMMON EQUITY DO YOU RECOMMEND FOR APS?

A Based on my analyses, I estimate APS's current market cost of equity to be 9.10%.

TABLE 10

Return on Common Equity Summary

Description	**Results**
DCF	8.80%
Risk Premium	9.30%
CAPM	8.90%

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[38] *Id.* at 3-40.

My recommended return on common equity of 9.10% is at the approximate midpoint of my estimated range of 8.80% to 9.30%. As shown in Table 10 above, the high-end of my estimated range is based on my risk premium studies. The low-end is based on my DCF return. The CAPM falls within my range.

My return on equity estimates reflect observable market evidence, the impact on Federal Reserve policies on current and expected long-term capital market costs, an assessment of the current risk premium built into current market securities, and a general assessment of the current investment risk characteristics of the electric utility industry, and the market's demand for utility securities.

IV.H. Financial Integrity

Q WILL YOUR RECOMMENDED OVERALL RATE OF RETURN SUPPORT AN INVESTMENT GRADE BOND RATING FOR APS?

A Yes. I have reached this conclusion by comparing the key credit rating financial ratios for APS at my proposed return on equity and the Company's actual test-year-end capital structure to S&P's benchmark financial ratios using S&P's new credit metric ranges.

Q PLEASE DESCRIBE THE MOST RECENT S&P FINANCIAL RATIO CREDIT METRIC METHODOLOGY.

A S&P publishes a matrix of financial ratios corresponding to its assessment of the business risk of utility companies and related bond ratings. On May 27, 2009, S&P

expanded its matrix criteria by including additional business and financial risk categories.[39]

Based on S&P's most recent credit matrix, the business risk profile categories are "Excellent," "Strong," "Satisfactory," "Fair," "Weak," and "Vulnerable." Most utilities have a business risk profile of "Excellent" or "Strong."

The financial risk profile categories are "Minimal," "Modest," "Intermediate," "Significant," "Aggressive," and "Highly Leveraged." Most of the utilities have a financial risk profile of "Aggressive." APS has an "Excellent" business risk profile and a "Intermediate" financial risk profile.

Q PLEASE DESCRIBE S&P'S USE OF THE FINANCIAL BENCHMARK RATIOS IN ITS CREDIT RATING REVIEW.

A S&P evaluates a utility's credit rating based on an assessment of its financial and business risks. A combination of financial and business risks equates to the overall assessment of APS's total credit risk exposure. On November 19, 2013, S&P updated its methodology. In its update, S&P published a matrix of financial ratios that defines the level of financial risk as a function of the level of business risk.

S&P publishes ranges for primary financial ratios that it uses as guidance in its credit review for utility companies. The two core financial ratio benchmarks it relies on in its credit rating process include: (1) Debt to Earnings Before Interest, Taxes, Depreciation and Amortization ("EBITDA"); and (2) Funds From Operations ("FFO") to Total Debt.[40]

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[39] S&P updated its 2008 credit metric guidelines in 2009, and incorporated utility metric benchmarks with the general corporate rating metrics. *Standard & Poor's RatingsDirect*: "Criteria Methodology: Business Risk/Financial Risk Matrix Expanded," May 27, 2009.

[40] *Standard & Poor's RatingsDirect*: "Criteria: Corporate Methodology," November 19, 2013.

Q HOW DID YOU APPLY S&P'S FINANCIAL RATIOS TO TEST THE REASONABLENESS OF YOUR RATE OF RETURN RECOMMENDATIONS?

A I calculated each of S&P's financial ratios based on APS's cost of service for its retail jurisdictional operations. While S&P would normally look at total consolidated APS financial ratios in its credit review process, my investigation in this proceeding is not the same as S&P's. I am attempting to judge the reasonableness of my proposed cost of capital for rate-setting in APS's retail regulated utility operations. Hence, I am attempting to determine whether my proposed rate of return will in turn support cash flow metrics, balance sheet strength, and earnings that will support an investment grade bond rating and APS's financial integrity.

Q DID YOU INCLUDE ANY OFF-BALANCE SHEET DEBT EQUIVALENTS?

A Yes, I did. The off-balance sheet debt equivalents and their associated amortization and interest expense were obtained from the S&P Capital IQ website for 2015 and used in my analysis presented on my Exhibit MPG-4 and Exhibit MPG-20.

Q PLEASE DESCRIBE THE RESULTS OF THIS CREDIT METRIC ANALYSIS AS IT RELATES TO APS.

A The S&P financial metric calculations for APS at a 9.10% return are developed on Exhibit MPG-20. The credit metrics produced below, with APS's financial risk profile from S&P of "Intermediate" and business risk score by S&P of "Excellent", will be used to assess the strength of the credit metrics based on APS's retail operations in Arizona.

APS's adjusted total debt ratio is approximately 52.1% from my Exhibit MPG-4, page 2. This adjusted debt ratio as discussed above, is generally consistent with the utility industry average adjusted debt ratio with a BBB bond rating, comparable to that of the proxy group, and reasonably consistent with an A- bond rating which is consistent with APS's current bond rating. Hence, I concluded this capital structure reasonably supports APS's current investment grade bond rating.

Based on an equity return of 9.10%, APS will be provided an opportunity to produce a debt to Earnings Before Interest, Taxes, Depreciation and Amortization ("EBITDA") ratio of 2.8x. This is within S&P's "Intermediate" guideline range of 2.5x to 3.5x."[41] This ratio supports an investment grade credit rating.

APS's retail operations FFO to total debt coverage at a 9.10% equity return is 31%, which is within S&P's "Intermediate" metric guideline range of 13% to 23%. This FFO/total debt ratio will support an investment grade bond rating.

At my recommended return on equity of 9.10% and the Company's embedded debt cost and capital structure, APS's financial credit metrics continue to support credit metrics at an investment grade utility level.

V. RESPONSE TO APS WITNESS DR. BENTE VILLADSEN

Q WHAT RETURN ON COMMON EQUITY IS APS PROPOSING IN THIS PROCEEDING?

A APS's proposed return on equity is supported by its witness Dr. Bente Villadsen. She recommends a return on equity for APS in the range of 10.25% to 10.75%, with a point estimate of 10.50% (Villadsen at 5).

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[41] *Id.*

Q **PLEASE DESCRIBE DR. VILLADSEN'S METHODOLOGY SUPPORTING HER RETURN ON COMMON EQUITY.**

A She arrived at her estimate using several models: a simple DCF, a traditional CAPM and an empirical CAPM ("ECAPM"), and a risk premium using a regression study. These models were applied to a group of 27 integrated electric utility companies, which Dr. Villadsen found had risk comparable to APS (Villadsen at 26-28). Dr. Villadsen also developed a subsample of her proxy group that have between 17% and 37% nuclear generation capacity. (Villadsen at 27).

Q **IS DR. VILLADSEN'S ESTIMATED RETURN ON EQUITY FOR APS REASONABLE?**

A No. Dr. Villadsen's recommended return on equity of 10.50% for APS is excessive and unreasonable for a low-risk regulated electric utility company. The unreasonableness of Dr. Villadsen's recommendation is evident from a detailed assessment of the rate of return models supporting her recommendation in this proceeding.

Q **PLEASE SUMMARIZE DR. VILLADSEN'S RETURN ON EQUITY STUDY RESULTS.**

A Dr. Villadsen's return on equity study results are summarized in the table below.

TABLE 11

Summary of Dr. Villadsen's Results

Model	Model ROE Results (1)	ATWACC ROE Adder (2)	Recommended ROE (3)	Adjusted ROE (4)
DCF				
Simple (Full)	9.3%	0.6%	9.9%	9.3%
Simple (Subsample)	9.7%	0.7%	10.4%	9.7%
Interest Rate DCF (Full)			10.3% - 10.4%	Reject
Interest Rate DCF (Subsample)			10.8% - 10.9%	Reject
Average				9.5%
CAPM				
CAPM	9.9% - 10.0%	0.1%-0.2%	10.0%-10.2%	9.4%
ECAPM	10.2% - 10.4%	0.1%-0.2%	10.4%-10.5%	
CAPM (Hamada)			10.0%-10.2%	Reject
ECAPM (Hamada)			10.3%-10.5%	Reject
				9.4%
Risk Premium	10.3%		10.3%	9.3%

Source:

Villadsen Direct testimony at 39, 44, 47 and Attachment BV-6DR, p. 33 of 44.

As shown in Table 11 above, the model return on equity results of Dr. Villadsen's studies applied to her proxy groups indicate that APS's current market return on equity is in the range of 9.3% to 10.0% for her DCF and CAPM studies, and 10.3% based on her risk premium study.

She then increases her market return on equity estimate by adding a return on equity adder in the range of 0.1% to 1.7% based on her After-Tax Weighted Average Cost of Capital ("ATWACC") methodology. This ATWACC adder increases her recommended range up to 9.9% to 10.4%. Dr. Villadsen asserts this ATWACC return on equity adder is necessary to properly recognize APS's financial risk when applying a market return on equity to its book value common equity.

However, as described below and as shown in Table 11 above under Column 4, Dr. Villadsen's own studies, adjusted to remove her flawed ATWACC return on equity adder and incorporate reasonable adjustments, support a return on equity no higher than 9.5% for APS in this proceeding.

Q **PLEASE DESCRIBE THE ISSUES YOU HAVE WITH DR. VILLADSEN'S ANALYSES.**

A The issues I have with Dr. Villadsen's analyses in this case include: (1) her ATWACC return on equity adder, (2) the application of the Hamada methodology, (3) her reliance on inflated Treasury bond yields in her CAPM and risk premium studies, and (4) the excessive growth rates used in her simple DCF growth model.

Q **PLEASE DESCRIBE DR. VILLADSEN'S PROPOSED ATWACC RETURN ON EQUITY ADDER.**

A Dr. Villadsen uses the ATWACC to increase the estimated market return on equity based on her DCF and CAPM analyses, to a higher return on equity that can be applied to APS's book value common equity. She does this by calculating the ATWACC using the market return on equity estimate (DCF and CAPM estimates) and market weighted capital structures for each proxy company. She then uses this market ATWACC and each company's book value capital structures to derive a return on equity that produces the same ATWACC on the proxy group's book capital structure that was produced on its market value capital structure.

These ATWACC adjustments to her return on equity estimates are discussed on pages 7-8 of her direct testimony and developed in Attachment BV-6DR.

Q WHY DOES DR. VILLADSEN BELIEVE THE ATWACC ADJUSTMENT TO HER DCF AND CAPM RETURN ESTIMATES IS REASONABLE?

A Dr. Villadsen suggests that the sample firms' financial risk is different based on the market value of common equity than is the financial risk based on the book value of common equity. Therefore, Dr. Villadsen proposes to upwardly adjust her DCF and CAPM model results for the difference in financial risk based on the proxy companies' market value of common equity, compared to its book value common equity.

She is in effect suggesting that firms have a different level of financial risk, depending on whether one is observing its market value capital structure or the book value capital structure.

Q IS THE ATWACC ADJUSTMENT TO THE BASE RETURN ON EQUITY REASONABLE?

A No. There are significant flaws in the financial logic of Dr. Villadsen's ATWACC methodology. However, more importantly in this case is Dr. Villadsen's ATWACC methodology is redundant with her methodology for increasing APS's operating income for a Fair Value Increment. Dr. Villadsen's ATWACC methodology simply adjusts the return on equity applied to OCRB based on the difference between fair value market valuation of securities relative to their book value. This is effectively the same thing as a Fair Value Increment adjustment to the operating income produced by an original cost rate of return.

However, Dr. Villadsen unjustifiably double counts a Fair Value Increment by adding it both to her recommended return on equity for ROR-OCRB adjusted by an ATWACC, and then also that adding a Fair Value Increment to the ATWACC adjusted ROR-OCRB. Dr. Villadsen's ATWACC methodology should be rejected for many reasons, most importantly for this case because it double counts the Fair Value Increment APS seeks in this proceeding.

Q PLEASE PROVIDE A DESCRIPTION OF WHY YOU THINK THE ATWACC METHODOLOGY IS INAPPROPRIATE FOR PRODUCING A RETURN ON EQUITY ADDER TO THE OCRB RETURN ON EQUITY ESTIMATE.

A The ATWACC adder is flawed for several reasons. First, contrary to Dr. Villadsen's claim, the Company only has one level of financial risk, not two. Investors do not assess a different amount of financial risk for market and book common equity valuation. Rather, financial risk is a singular risk factor which describes the utility's financial capital structure, cash flow strength to support financial obligations, and default provisions under its financial obligations.

Dr. Villadsen's belief that there are two levels of financial risk is simply neither supported nor rational. Indeed, it is contradicted by data used by independent market participants to assess investment risk and credit standing. For example, S&P and *Value Line* provide general assessments of the financial and operating (or total investment) risks to the market investors. S&P does this in terms of rating the credit quality of the utility, based on the utility's ability to produce cash flows adequate to meet its book value financial obligations. S&P assesses a company's risk of failing to meet its financial obligations and is a direct assessment of a company's financial risk.

Value Line on the other hand provides information to the market participants to help them assess the total investment risk (including both financial risk and business risk) of utilities and other stock investments. The data *Value Line* provides to investors concerning the investment risk characteristics of stocks it follows relates to book value risk factors including book value capital structure, book value debt/financial obligations, book value cash flows, and book value earnings. All these book value factors are then used by investors to assess investment risk which allows them to derive market value stock prices. The book value parameters are an integral part of assessing risk and allowing investors to produce market stock valuations. There is not a difference between book value risk and the market value risk. Rather, the book value and market value risks are interconnected to one another, and lead to a single finding of financial risk.

Both *Value Line* and S&P assess a company's financial risk based on its book value leverage, book value cash flows, and the earnings on its book value common equity. These independent published sources of information that investors rely upon do not equate financial risk to market value capital structures. This is most likely because a company's ability to produce earnings and cash flows that are adequate to meet its debt service obligations, to produce earnings that are capable of paying dividends and growing dividends over time are based on book value financial factors.

Q DO YOU BELIEVE THAT THE ATWACC METHODOLOGY IS REASONABLE POLICY FOR SETTING AN APPROVED RETURN ON EQUITY?

A No. The ATWACC methodology is poor regulatory policy and should be rejected for several reasons.

1. First, it does not produce clear and transparent objectives for management to use that will accomplish the objective of minimizing its overall rate of return while preserving its financial integrity. Therefore, a regulatory commission cannot oversee the reasonableness and prudence of management decisions in managing its capital structure. Under the ATWACC theory, management's decisions to manage its capital structure can be skewed by changes in market value which change the market value capitalization mix. Management simply has no control over the market value capital structure, but it does have control over the book value capital structure. As such, setting the rate of return and measuring risk based on book value capital structure creates a more transparent and clear path for regulatory oversight of management's effort to maintain a balanced and reasonable capital structure.

2. Second, the ATWACC introduces significant additional instability into the utility's cost of service and tariff rates. Book value capital structure weights permit the utility to hedge or lock-in a large portion of capital market costs in arriving at the rate of return used to set rates. This rate of return cost hedge stabilizes the utility's cost of service, which in turn helps stabilize utility rates. A stable method of setting rates also allows investors to more accurately assess the future earnings and cash flow outlooks for the utility, which will reduce the business risk of the utility. The ATWACC, on the other hand, will produce an overall rate of return which will change based on both changes to market value capital structure weights and also based on changes to market capital costs. Hence, a major component of the cost structure of the utility (i.e., the overall rate of return) will vary based on market forces from rate case to rate case. This rate of return variability will introduce significant instability in the utility's cost of service (via rate of return changes) and hence instability in tariff rates. Introducing additional instability in the utility's cost structure and rates will not benefit either investors or ratepayers.

3. The ATWACC unnecessarily increases rates to produce an excessive ROE opportunity for utility investors. Inflating utility's rates to provide this excessive earnings opportunity is unjust and unreasonable and should be rejected.

Q HAS THE ATWACC METHODOLOGY PROPOSED BY DR. VILLADSEN BEEN ACCEPTED IN RATE-SETTING PROCEEDINGS IN THE UNITED STATES?

A No. The ATWACC methodology has been consistently rejected in state jurisdictions throughout the country. The ATWACC methodology has been rejected by regulators for many reasons:

1. Designed to produce a higher return and no confidence in evidence supporting the ATWACC. (California Public Utilities Commission, Docket No. A.08-05-002, California-American Water Company, May 2009).

2. Method that inflates the rate of return by overstating the Company's financial risk and inflating rates to overcompensate utility investors. The Company simply provided inadequate justification for departing from the traditional method of estimating the rate of return. (Arizona Corporation Commission, Arizona-American Water Company, Docket No. W-01303A-05-0405, July 2006).

3. Is an unproven and never used methodology that is not reliable for setting rates. (Ohio Public Utilities Commission, Cause Nos. 07-551-EL-AIR *et al.*, Ohio Edison Company *et al.*, January 2009).

4. The Commission was not persuaded that the ATWACC methodology was appropriate for setting rates and declined to use it in the rate proceeding. (Public Service Commission of Wisconsin, Wisconsin Electric Power Company, 5-UR-103, January 2008).

V.A. Dr. Villadsen's CAPM Analysis

Q PLEASE DESCRIBE DR. VILLADSEN'S CAPM ANALYSIS.

A Dr. Villadsen develops two versions of the CAPM model, a traditional CAPM and an Empirical ("ECAPM).[42]

In her analyses, Dr. Villadsen relied upon two different scenarios. In the first scenario, she used a risk-free rate of 4.73% and a market risk premium of 7.0%. In the second scenario, she used a risk-free rate of 3.93% and a market risk premium of 8.0%.[43] For each scenario, she calculated CAPM result and ECAPM results with an alpha of 1.5% for her full and subsample. Based on her first scenario Dr. Villadsen produced a traditional CAPM, before the ATWACC adder of 10.0% (full sample) and 9.9% (subsample). Similarly, applying the ECAPM, before the ATWACC adder, the results are 10.4% (full sample) and 10.3% (subsample).[44] The results of Dr. Villadsen's second scenario, before the ATWACC adder, are almost identical.[45] Her estimates are then increased by approximately 10 to 20 basis points, and fall in the range of 10.0% to 10.5%, with the high-end of the range produced by the ECAPM.

Dr. Villadsen also offers an additional methodology to account for the financial risk differential between the proxy group companies and APS. She applies the Hamada method for de-levering and re-levering the beta component in both the CAPM and the ECAPM with and without the effect of taxes. This methodology produces very similar results to Dr. Villadsen's application of ATWACC. Applying the Hamada formula increases the Value Line beta from 0.76 to 0.78 for the full sample and from 0.74 to 0.75 for the subsample.[46] The Hamada model produces CAPM results in the range of 10.0% to 10.2% and ECAPM results in the range of 10.3% to 10.5%.[47]

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[42] Villadsen Direct Testimony at 39.
[43] *Id.* at 36.
[44] Attachment BV-6DR, at 36.
[45] Attachment BV-6DR, at 37.
[46] Villadsen Direct at 39 and Attachment BV-6DR, p. 41-42.

Q WHAT ISSUES DO YOU TAKE WITH DR. VILLADSEN'S CAPM ANALYSIS?

A My concern with Dr. Villadsen's traditional CAPM estimate largely concerns her choice of a risk-free rate estimate, the time period of the projected Treasury bond yields, and related spreads that were used to produce these estimates. As discussed below, Dr. Villadsen's projected Treasury bond yields are inconsistent with consensus independent market economists' outlooks for future interest rates, and hence Dr. Villadsen's risk-free rate used in her CAPM return estimates simply do not reflect the current market cost of capital.

My concerns with Dr. Villadsen's ECAPM include risk-free rate estimates that do not reflect market participants capital cost outlooks, but also the unjustified use of an adjusted beta within the ECAPM study. An ECAPM study is based on unadjusted, or raw, beta estimates. Effectively, a beta adjustment in an ECAPM study double counts the same impact on the CAPM return estimate. A traditional CAPM study using adjusted betas will flatten the security market line, and increase the CAPM return estimates for companies with betas below 1, and reduce the CAPM return estimate for companies with betas greater than 1. Using the ECAPM study and unadjusted betas produces the same result. There is no academic support for using an adjusted beta within an ECAPM study. Using an adjusted beta within an ECAPM as Dr. Villadsen does distorts the slope of the security market line for estimating a return based on changes in investment risk, and produces an unreliable and inflated

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[47] *Id.*, p. 43-44.

CAPM return for companies with adjusted betas less than 1 such as Dr. Villadsen's proxy group in this proceeding.

Finally, to account for financial risk, Dr. Villadsen applies her ATWACC methodology and the Hamada equation. As discussed above the use of these approaches, which technically achieve the same results is inappropriate and should be rejected.

Q PLEASE DESCRIBE YOUR CONCERN WITH DR. VILLADSEN'S RISK-FREE RATE PROJECTIONS.

A As noted above, at the time of her analysis Dr. Villadsen relied on risk-free rate projections of 4.73% and 3.93% for her CAPM and ECAPM methodologies, respectively. Her analysis was generally conducted around February 2016. Dr. Villadsen developed her risk-free rate estimates by starting with 10-year Treasury bond notes, and making the adjustments for term to maturity projections, and outlooks for changes in yield spreads between Treasuries and corporate bonds. Importantly, Dr. Villadsen's projections simply overstate independent market participants' outlooks for future interest rates around the time she performed her study. Specifically, her 4.73% projection simply does not reflect consensus market outlooks. In the *Blue Chip Financial Forecasts* dated September 2015, the 30-year Treasury bond projected yield two years out was 3.9%.[48] For this reason, Dr. Villadsen's 4.73% risk-free rate simply does not reflect independent market economists' outlooks for interest rates at the time she performed her study. More recent projections for 30-year Treasury bond yields reflect a consensus outlook by independent market economists of around 3.4%.[49] For these reasons, Dr. Villadsen's risk-free rate projections simply do not reflect independent market participants' outlooks for risk-free rates at the time she performed her analysis, and substantially overstate current market cost of capital for APS.

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[48] *Blue Chip Financial Forecasts*, October 1, 2015 at 2.
[49] *Blue Chip Financial Forecasts*, December 1, 2016 at 2.

Q CAN A REASONABLE ESTIMATE OF AN ECAPM BE USED TO RELIABLY ESTIMATE APS'S COST OF EQUITY IN THIS CASE?

A Because the makeup of the ECAPM model is based on a raw or regression beta, if the appropriate beta is used in the ECAPM it would produce a reasonable return estimate. As such, if the adjusted *Value Line* betas are modified to remove *Value Line*'s adjustment to the regression beta for the long-term tendency to converge on the market beta of 1, the *Value Line* unadjusted beta can be properly used in the ECAPM study.

Removing the beta adjustment to reflect a raw beta for an ECAPM will generally produce a comparable result to the traditional CAPM using an adjusted beta. For example, on Dr. Villadsen's Attachments BV-60R, page 37, she produces an average CAPM cost for her proxy group of 10%, and an ECAPM return of 10.4%. The average proxy group adjusted Value Line beta to produce a 10% CAPM return is approximately 0.76. This would equate to an unadjusted beta estimate of 0.61. Using a raw beta of 0.61[50] and Dr. Villadsen's ECAPM methodology produces an ECAPM estimate of 9.40%.[51]

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[50] (Adj. Beta - 0.35)/0.67 = Raw Bea. (0.76 – 0.35)/0.67 = 0.61.

[51] ECAPM (Raw Beta) = RF + 0.19 x MRP + 0.81 x MRP x Raw Beta.
ECAPM (0.61) = 3.93% + 0.19 x 8.0% + 0.81 x 8.0% x 0.61 = 9.40%.

Q IS DR. VILLADSEN'S APPLICATION OF THE HAMADA METHODOLOGY REASONABLE?

A No. Dr. Villadsen's proposal to de-lever and then re-lever the beta suggests that utilities' financial risk can be measured by only changes in common equity weights of capital structure, and that financial risk is the only relevant systematic risk reflected in beta. Neither of these factors are accurate. First, a utility company's financial risk is a component of capital structure mix, but also can be impacted by its embedded cost of debt, debt maturity and other liquidity factors. For example, a utility that has lower cost debt and a higher debt percentage of total capital, may have lower financial risk than a utility with a lower debt ratio if its cash flow coverages of interest and total debt are stronger than the latter company. Dr. Villadsen's analysis is not based on a complete assessment of financial risk.

Also, financial risk is not the only systematic risk that should be considered in adjusting beta. Systematic risk can include many factors that were not properly considered by Dr. Villadsen. Applying the Hamada methodology is just another way of increasing the CAPM results. Therefore, Dr. Villadsen's results based on this approach should be completely disregarded by the Commission because they serve only one purpose, to inflate revenue requirements for APS's ratepayers.

Q CAN DR. VILLADSEN'S CAPM ANALYSIS BE REVISED TO PRODUCE A REASONABLE RETURN ON EQUITY FOR APS?

A Yes. Rejecting Dr. Villadsen's ATWACC and Hamada methodologies and using a current risk-free rate projection from an independent market participant of 3.40%, her market risk premium of 8.0% and group average betas of 0.76 (full sample) and 0.74

(Subsample), will produce a CAPM return of 9.48% and 9.32%, respectively.[52] Therefore, a reasonable return for APS based on Dr. Villadsen's CAPM models with updated and reasonable adjustments will produce a fair return for APS in the range of 9.3% to 9.5%, with a midpoint of 9.4%.

V.B. Dr. Villadsen's DCF Analysis

Q PLEASE DESCRIBE DR. VILLADSEN'S DCF ANALYSIS.

A Dr. Villadsen developed a constant growth DCF model based on a combined growth rate from IBES consensus analysts' and Value Line growth rate projections. Dr. Villadsen's DCF model results are 9.3% and 9.7% for her full and subsample groups, respectively. After she applied her ATWACC adder the results increase to 9.9% (full) and 10.4% (subsample). Dr. Villadsen further increased the DCF return results by 46 basis points to account for the flight to safety, which she believes caused utility stock prices to increase, which in turn created a downward pressure on dividend yields. To determine her adjustments she relied on her contention that there is an inverse relationship between P/E ratios and Treasury yields.[53] Therefore, she concludes that after she considers the impact on interest rates on the DCF inputs her DCF results fall in the range of 10.3% - 10.4% (full sample) and 10.8% - 10.9% (subsample).

Q PLEASE DESCRIBE THE ISSUES YOU HAVE WITH DR. VILLADSEN'S DCF ANALYSIS.

A I have several issues with Dr. Villadsen DCF analysis. First, as I discussed above the use of the ATWACC methodology is inappropriate and should be rejected. Second, similar to my DCF models, Dr. Villadsen DCF studies are based on growth rate estimates of 5.5% (full sample) and 6.0% (subsample)[54], which significantly exceeds the long-term sustainable growth rate of 4.25%[55] as published by the consensus economists. Hence, her DCF results can be used only as high-end estimates. Finally, Dr. Villadsen attempt to account for the currently low interest rate environment by increasing the DCF results by 46 basis points is without merit, biased and should be rejected.

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[52] 3.40% + 8.00% x 0.76 = 9.48% and 3.40% + 8.00% x 0.74 = 9.32%, with a midpoint rounded to 9.4%.

[53] Villadsen Direct Testimony at 42-44.

Q WHY DO YOU BELIEVE DR. VILLADSEN 0.46% ADDER IS UNREASONABLE?

A Dr. Villadsen's attempt to develop an appropriate adder to account for the currently low interest rate environment is flawed for several reasons. First, the results of her study are statistically insignificant. Dr. Villadsen presents the results of her P/E regression on Attachment BV-11DR. The R-square determines the significance of the relationship of the 20-Year Treasuries and the P/E ratios. Based on her results the R-square is no higher than 15%, which shows that there is no statistical significance between the two variables. This significance might be improved if other explanatory variables are included in the regression study. Further, the p-value for 70% of the individual companies are significantly higher than 0.025 (for a two-tailed test). Therefore, the relationship between the P/E ratios and the Treasury yields is not statistically significant. This means it does not produce a reliable result.

Second, Dr. Villadsen assumes that the change in dividend yields is only triggered by changes in interest rates, which in turn drives changes in the utility stock prices. This is a very simplistic assumption and it does not reflect sound valuation principles. There are many factors that could trigger changes in dividend policy.

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[54] Exhibit MPG-21.

[55] *Blue Chip Financial Forecasts*, December 1, 2016 at 12.

There are many factors which can impact stock valuation, particularly for relatively low-risk utility stocks. Most importantly, in the current market, investors are paying premiums for relatively low-risk stable investments like utility stocks. As such, the premium investors are willing to pay drive up stock prices and dividend yields go down. Further, as a result of this demand for relatively low-risk utility stock prices, utility stock costs of capital also have declined.

Q CAN DR. VILLADSEN'S DCF ANALYSIS BE REVISED TO PRODUCE A FAIR RETURN ON EQUITY FOR APS.

A Yes. Disregarding Dr. Villadsen unreasonable ATWACC methodology and her flawed 46 basis points adder, and developing a multi-stage DCF study to account for changing growth outlooks will produce a DCF return of 8.2% (full sample) and 8.3% (subsample) as shown on Exhibit MPG-21. Therefore, I conclude that a DCF return in the range of 8.2% to 9.7% reflects the range of APS's market cost of capital.

V.C. Dr. Villadsen's Risk Premium Analyses

Q PLEASE DESCRIBE DR. VILLADSEN'S RISK PREMIUM ANALYSES.

A As shown on her Attachment BV-8DR, Dr. Villadsen measured the relationship of authorized returns on equity to long-term Treasury yields between 1990 and the fourth quarter of 2015 through a regression analysis. She then uses the resulting regression formula to predict a risk premium based on a forecasted long-term Treasury yield of 4.73% from October 2015.[56] This regression formula and her forecasted Treasury yield of 4.73% produced an estimated risk premium of 6.08%. Dr. Villadsen then added her estimated risk premium of 6.08% to the forecasted

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[56] Villadsen Direct testimony at 47.

Treasury yield of 4.73% to produce a cost of equity estimate of 10.8%, which she reduces by 50 basis points to 10.3% to account for APS lower risk based on the Company's proposed common equity ratio of 56% relative to the recently authorized common equity ratios for integrated electric utilities.

Q DO YOU HAVE ANY ISSUES WITH DR. VILLADSEN'S FRISK PREMIUM BASED ON A REGRESSION ANALYSIS OF INTEREST RATES AND RISK PREMIUMS?

A Yes. Dr. Villadsen's regression model reflects a simplistic, linear relationship between equity risk premiums and interest rates. This overly simplistic relationship is not based on basic risk and return valuation principles. While academic studies have shown that there has been a linear and inverse relationship between these variables in the past, but researchers have found that the relationship changes over time and is influenced by changes in perception of the investment risk of bond investments relative to equity investments, rather than only changes to nominal interest rates.[57]

In the 1980s, equity risk premiums were inversely related to interest rates, but that was likely attributable to the interest rate volatility that existed at that time. When interest rates were more volatile, the relative perception of bond investment risk increased relative to the investment risk of equities. This changing investment risk perception caused changes in equity risk premiums.

In today's marketplace, interest rate volatility is not as extreme as it was during the 1980s.[58] Nevertheless, changes in the perceived risk of bond investments relative to equity investments still drive changes in equity premiums. However, a relative investment risk differential cannot be measured simply by observing nominal interest rates. Changes in nominal interest rates are highly influenced by changes to inflation outlooks, which also change equity return expectations. As such, the relevant factor needed to explain changes in equity risk premiums is the relative changes to the risk of equity versus debt securities investments, and not simply changes in interest rates.

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[57] "The Market Risk Premium: Expectational Estimates Using Analysts' Forecasts," Robert S. Harris and Felicia C. Marston, *Journal of Applied Finance*, Volume 11, No. 1, 2001; "The Risk Premium Approach to Measuring a Utility's Cost of Equity," Eugene F. Brigham, Dilip K. Shome, and Steve R. Vinson, *Financial Management*, Spring 1985.

[58] Morningstar SBBI, 2009 Classic Yearbook at 95-96.

Importantly, Dr. Villadsen's analysis simply ignores investment risk differentials. She bases her adjustment to the equity risk premium exclusively on changes in nominal interest rates. This is a flawed methodology and does not produce accurate or reliable risk premium estimates. As such, her argument should be rejected by the Commission.

Q DO YOU HAVE ANY OTHER CONCERNS WITH DR. VILLADSEN'S RISK PREMIUM STUDY?

A Yes. She uses a forecasted Treasury bond yield of 4.73%, which was based on a *Blue Chip Economic Indicator* from October 2015. This forecasted Treasury bond yield substantially exceeds the current independent market participants' outlook for future Treasury bond yields, at least over the next year, when the rates determined in this proceeding likely will be in effect. The *Blue Chip Financial Forecasts*' most current projected 10-year Treasury bond yield over the next two years is 2.7%.[59]

Q CAN DR. VILLADSEN'S RISK PREMIUM STUDY BE MODIFIED TO PRODUCES A REASONABLE RETURN FOR APS?

A Yes. Disregarding Dr. Villadsen's simplistic inverse relationship, using the most recent projected 10-year yield of 2.7% and Dr. Villadsen's 53 basis points adder to convert it to a 20-year maturity will produce a Treasury yield of 3.23% as discussed above. Adding this Treasury yield to my equity risk premium of 6.1% produces a risk premium return on equity for APS of 9.3%. Similarly, as noted above, independent economists are projecting future 30-year Treasury bond yields to be 3.4% over the next two years. Reflecting a risk premium of 6.1%, and a projected 3.4% Treasury bond yield implies a return on equity for APS of 9.5%. Both of these estimates reflect more recent projections of future Treasury bond yields and Dr. Villadsen's estimated equity risk premium shows that APS's current market cost of equity is no higher than 9.5%.

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[59] *Blue Chip Financial Forecasts*, December 1, 2016 at 2.

Q DID DR. VILLADSEN ALSO OFFER AN ASSESSMENT OF CURRENT MARKET CONDITIONS IN SUPPORT OF HER RECOMMENDED RETURN ON EQUITY?

A Yes. Dr. Villadsen suggests a few factors that gauge investor sentiment, including interest rates, market volatility, measured by the CBOE Volatility Index, known as the VIX and the changing P/E ratios.[60] She concludes that low interest rates resulted in high utility spreads and the market volatility in the early part of 2016 has been higher than the volatility observed in the past.

Q DO YOU BELIEVE THAT DR. VILLADSEN'S USE OF THESE MARKET SENTIMENTS SUPPORTS HER FINDINGS THAT APS'S MARKET COST OF EQUITY IS CURRENTLY IN THE UPPER END OF THE RANGE OF HER RESULTS?

A No. In many instances Dr. Villadsen's analysis simply ignores market sentiments favorable toward utility companies and instead lumps utility investments in with higher- risk corporate investments. A fair analysis of utility securities shows the market generally regards utility securities as low-risk investment instruments and supports the finding that utilities' cost of capital is very low in today's marketplace.

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[60] Villadsen Direct Testimony at 11-23.

Q WHAT IS THE MARKET SENTIMENT FOR UTILITY INVESTMENTS?

A The market sentiment toward utility investments, rather than just general corporate investments, is that the market is placing high value on utility securities recognizing their low risk and stable characteristics.

For example, this is illustrated by my Exhibit MPG-16, under column 11 showing the spread between "A" rated utility bond yields and "Aaa" rated corporate bond yields. Currently, the spread is approximately 0.28%. This is a relatively low spread over the 36-year time horizon. Indeed, current spreads of utility versus high-grade corporate bond yields are at the lowest level they have been in most periods over the last 36 years. This is also reflective of the spreads between "Baa" utility bond yields relative to "Baa" corporate bond yields. Currently, utility bonds are trading at a premium to corporate bonds. This has been largely the case during the significant market turbulence that has occurred over the last five to eight years. However, over longer periods of time, utility bond yields on average trade at parity to a premium to corporate "Baa" rated bond yields. The current strong utility bond valuation is an indication of the market's sentiment that utility bonds have lower risk than general corporate bonds and are generally regarded as a safe haven by the investment industry.

Further, other measures of utility stock valuations also support a robust market for utility stocks. As shown on my Exhibit MPG-3, utility valuation measures – *e.g.*, price-to-earnings ratio, market-to-book ratio, and market price to cash flow ratio

– show stock valuation measures for the proxy groups are robust. For example, for the proxy group, the current price-to-earnings ratio is comparable to and the cash flow ratio is stronger than the 14-year average valuation metrics.

For all these reasons, direct assessments of valuation measures and market sentiment toward utility securities support the credit rating agencies' findings, as quoted above, that the utility industry is largely regarded as a low-risk, safe haven investment. All of this supports my finding that utilities' market cost of equity is very low in today's very low cost capital market environment.

Q DO YOU HAVE ANY FURTHER COMMENTS IN REGARD TO DR. VILLADSEN'S INTEREST RATE PROJECTIONS?

A Yes. First, it is simply not known how much, if any, long-term interest rates will increase from current levels or whether they have already fully accounted for the termination of the Federal Reserve's Quantitative Easing program and the increase in the Federal Funds rate. Nevertheless, I do agree that this Federal Reserve program introduced risk or uncertainty in long-term interest rate markets. Because of this uncertainty, caution should be taken in estimating APS's current return on common equity in this case. However, as noted in the EEI quote above, the increase in short-term interest rates had no impact on longer-term yields that "remain at historically low levels and are influenced more by the level of inflation and economic strength than by the Fed's short-term rate policy.[61]"

Second, I would note APS is largely shielded from significant changes in capital market costs. To the extent interest rates ultimately increase above current levels, which may have an impact on required returns on common equity, at that point in time, APS, like all other utilities, can file to change rates to restate its authorized rate of return at the prevailing market levels.

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[61] *EEI Q4 2015 Financial Update*: "Stock Performance" at 6.

Finally, while current observable interest rates are actual market data that provides a measure of the current cost of capital, the accuracy of forecasted interest rates is problematic at best.

Q WHY DO YOU BELIEVE THAT THE ACCURACY OF FORECASTED INTEREST RATES IS HIGHLY PROBLEMATIC?

A Over the last several years, observable current interest rates have been a more accurate predictor of future interest rates than economists' consensus projections. Exhibit MPG-22 illustrates this point. On this exhibit, under Columns 1 and 2, I show the actual market yield at the time a projection is made for Treasury bond yields two years in the future. In Column 1, I show the actual Treasury yield. In Column 2, I show the projected yield two years out.

As shown in Columns 1 and 2, over the last several years, Treasury yields were projected to increase relative to the actual Treasury yields at the time of the projection. In Column 4, I show what the Treasury yield actually turned out to be two years after the forecast. In Column 5, I show the actual yield change at the time of the projections relative to the projected yield change.

As shown in this exhibit, economists consistently have been projecting that interest rates will increase over several years. However, as shown in Column 5, those yield projections have turned out to be overstated in almost every case. Indeed, actual Treasury yields have decreased or remained flat over the last several years rather than increased as the economists' projections indicated. As such, current observable interest rates are just as likely, maybe more likely, to accurately predict future interest rates as are current economists' projections.

Q DID DR. VILLADSEN CONSIDER ADDITIONAL BUSINESS RISKS TO JUSTIFY A RETURN ON EQUITY ABOVE THE MIDPOINT OF HER RANGE?

A In addition to the effect of decoupling mechanisms on ROE, Dr. Villadsen believes that APS's substantial reliance to nuclear generation, its magnitude of distributed generation, APS's inability to earn its authorized return on equity in the last 13 years, and its smaller size, relative to the proxy group will warrant a return on equity above the midpoint of her range.[62] I disagree. Setting the return on equity above the midpoint of Dr. Villadsen's model results will place an unreasonable burden on the ratepayers and should be rejected. As discussed below, APS's relative risk is comparable to the risk of the utility companies included in the proxy group.

Q WHY DO YOU BELIEVE THAT APS FACES RISKS THAT ARE COMPARABLE TO THE RISKS FACED BY PROXY GROUP COMPANIES?

A As shown on my Exhibit MPG-5, the average S&P credit rating for my proxy group of BBB+ is lower, albeit comparable to APS's credit rating of A-. The relative risks discussed on pages 48-54 of Dr. Villadsen's testimony are already incorporated in the credit ratings of the proxy group companies. S&P and other credit rating agencies go through great detail in assessing a utility's business risk and financial risk in order to evaluate their assessment of its total investment risk. Therefore, this total risk investment assessment of APS, in comparison to a proxy group, is fully absorbed into the market's perception of APS's risk and the proxy group fully captures the investment risk of APS.

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[62] Villadsen Direct Testimony at 48-54.

Q HOW DOES S&P ASSIGN CORPORATE CREDIT RATINGS FOR REGULATED UTILITIES?

A In assigning corporate credit ratings the credit rating agency considers both business and financial risks. Business risks among others include company's size and competitive position, generation portfolio, capital expenditure programs as well as a consideration of the regulatory environment, current state of the industry and the economy as whole. Specifically, S&P states:

> To determine the assessment for a corporate issuer's business risk profile, the criteria combine our assessments of industry risk, country risk, and competitive position. Cash flow/leverage analysis determines a company's financial risk profile assessment. The analysis then combines the corporate issuer's business risk profile assessment and its financial risk profile assessment to determine its anchor. In general, the analysis weighs the business risk profile more heavily for investment-grade anchors, while the financial risk profile carries more weight for speculative-grade anchors.[63]

V.C. ROR-FVRB

Q DID DR. VILLADSEN COMMENT ON APS'S RECOMMENDED ROR-FVRB?

A Yes. Dr. Villadsen finds APS's ROR-FVRB of 5.84% conservative because based on her methodology as described on pages 58-59 of her direct testimony the ROR-FVRB should be 7.64%.

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[63] Standard & Poor's RatingsDirect: "Criteria/Corporates/General: Corporate Methodology," November 19, 2013.

Q WHAT ANALYSIS DID DR. VILLADSEN PERFORM TO CONCLUDE THAT THE COMPANY'S REQUESTED ROR-FVRB OF 5.84% IS REASONABLE?

A She performed two methodologies. First, she compared the market valuations of integrated electric utility companies to the book value of those same companies. Based on that study, she concluded that integrated electric utility companies generally trade at 1.8 times the book value of assets at transmission companies. From this, she states the multiple for the fair value rate base compared to the original cost rate base is reasonable.

Q PLEASE COMMENT ON DR. VILLADSEN'S FAIR VALUE TESTING METHODOLOGY.

A Dr. Villadsen's methodology supports my conclusion which will be described in detail below, that an increment for fair value in establishing the operating income for APS is not justified. Dr. Villadsen's review of the current valuation of integrated electric utility companies is based in large part by the earnings outlook for these companies. That is, the market valuations of the electric utility companies are largely tied to the expected earnings and cash flow of the underlying companies. As described above, Arizona and Indiana are the only jurisdictions which I am aware of that consider a Fair Value Increment in establishing a rate of return. My experience in Indiana is that the commission generally sets an operating income entitlement largely based on the results of the original cost rate of return.

Across the country, authorized returns on equity for integrated electric utility companies have dropped down to about 9.5% on original cost book value measures. It is this rate of return which has supported the valuations considered by Dr. Villadsen in her methodology. As such, awarding APS a return on equity of around 9.5% in this case would likely support a market valuation for APS of approximately 189% of its book value. In other words, an original cost rate of return will provide ample compensation on the fair value of APS's rate base and original cost rate base. This occurs simply by the observable market evidence that original cost rate of return on common equity of 9.5% will support a market valuation of the underlying company which exceeds the company's estimated fair value differential between its fair value rate base and original rate base.

V.D. Fair Value Revenue Increment

Q PLEASE DESCRIBE APS'S DEVELOPMENT OF THE FAIR VALUE RATE OF RETURN

A The fair value rate of return is developed by Mr. Snook at his Attachment LRS-3RD of his direct testimony. This ROR-FVRB is applied to APS's estimated FVRB of $9.976 billion. The FVRB is the weighted average of an OCRB of $6.771 billion (50%) and a Replacement Cost New, Depreciated ("RCND") rate base of $13.180 billion (50%). On its Schedule A-1, APS uses an FVRB of $9.976 billion, and fair value rate of return of 5.84% to derive its requested ROI of $550.495 million.

Q HOW IS THIS ROR-FVRB USED BY APS TO DEVELOP ITS REVENUE REQUIREMENT IN THIS PROCEEDING?

A As developed on APS's Schedule A-1, the ROR-FVRB is used to produce a target or ROI of $550.495 million. This operating income is then used to develop a Fair Value Increment to the Company's ROR-OCRB of 8.13% which produces the targeted operating income. The Company adds a Fair Value Increment of 0.47% to its recommended ROR-OCRB of 8.13%, to produce an adjusted ROR-OCRB of 8.60%, which derives the targeted FV operating income. Based on the difference between the operating income and equivalent revenue requirement based on ROR-FVRB and ROR-OCRB, APS is requesting a Fair Value Revenue Increment of $51.9 million.

Q HOW DID MR. SNOOK DEVELOP THE 1.0% FAIR VALUE INCREMENT?

A Mr. Snook relied on the Fair Value Increment developed by Staff witnesses Mr. Ralph Smith and Mr. David Parcell in APS's last rate case.[64] (Snook Direct at 33). In that case, Mr. Parcell offered two methods of developing an FVROR. The first one, which as I understand is Staff's preferred method, assigns 0.0% cost on the Fair Value Increment.[65] The second one is an alternative method which the FVROR is no higher than the market real risk-free rate.[66] Mr. Parcell determined the real risk-free rate based on the long-term projected Treasury yield of 4.0% for 2011-2012 less than the projected inflation of 2.0% for the same period as measured by the Consumer Price Index ("CPI"), which results in a real risk-free rate of 2.0%. Using Mr. Parcell's recommended fair value return of 0.0%, and a market risk-free rate of 2.0%, produces a midpoint fair value return of 1.0%.

Q DO YOU HAVE ANY COMMENTS IN REGARDS TO THE DEVELOPMENT OF THIS FAIR VALUE INCREMENT?

A Yes. This fair value cost increment was developed five years ago and the data provided in APS's last rate case is stale. Using the 30-year projected Treasury yield of 3.4% less the projected inflation of 2.3%,[67] results in a real return outlook in the current market of 1.1%. Developing a fair value return in the range of 1.1% based on current estimates of the risk-free rate in the current market, and a 0.0% Fair Value Increment generally supported by the Arizona Staff, produces a midpoint Fair Value Increment estimate of 0.55%.

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[64] Docket No. E-01345A-11-0224.
[65] Docket No. E-01345A-11-0224, Parcell Direct testimony at 48.
[66] Docket No. E-01345A-11-0224, Parcell Direct Testimony at 49.
[67] *Blue Chip Financial Forecasts*, December 1, 2016 at 2.

While I agree with the Staff that a Fair Value Increment of 0.0% is the most balanced and reasonable finding in this case, using the precedent established in APS's prior rate cases would support a Fair Value Increment of no higher than 0.55% in the current market.

Q WHY IS A FAIR VALUE ADJUSTMENT TO APS'S ROR-OCRB NOT REASONABLE?

A The ROI of APS should be based on either an original cost or fair value methodology. It is not appropriate for APS to add an increment rate of return to the ROR-OCRB in order to support its requested ROI. Indeed, adding an increment to the traditional method of estimating an ROR-OCRB, shows that the proposed operating income of APS is excessive.

Q WHY SHOULD THE NET OPERATING INCOME BE THE SAME USING EITHER AN ORIGINAL COST OR FAIR VALUE METHODOLOGY?

A Investors should be fairly compensated and rates should be just and reasonable using either an original cost or a fair value rate-setting methodology. In an original cost methodology, investors are compensated entirely by the allowed return on rate base. The increase in value of the assets included in rate base is not reflected in the original cost methodology. Therefore, investors are compensated for the expectation that asset values will increase over time, by applying a market-based rate of return to the original cost of assets. This provides total compensation to investors on a current basis through the rate of return.

On the other hand, in a fair value methodology, the expected escalation or growth to the value of utility assets is reflected in setting rates. Therefore, the total return to investors in a fair value methodology includes both the expected growth in the value of the assets (i.e., growth in the Fair Value Rate Base), plus the ROR-FVRB.

The primary difference between an ROR-OCRB and an ROR-FVRB relates to compensating investors for the expected investment growth. In an ROR-OCRB, the expected growth rate in asset values is included in the rate of return and investors are compensated for this growth in the utility's operating income. Conversely, in a fair value methodology, expected growth in the value of the assets is picked up in the growth to the rate base itself, and not in the rate of return.

Regardless of the methodology, however, the net operating income should be approximately the same.

Q CAN YOU PROVIDE AN ILLUSTRATION AS TO WHY THE REQUIRED RETURN COMPONENT FOR AN ROR-OCRB AND AN ROR-FVRB SHOULD BE REASONABLY COMPARABLE?

A Yes. An example is shown below in Table 12. Under the original cost methodology, if the beginning of year rate base is $100, the return is assumed to be 10%, escalation to the value of utility assets is assumed to be 3%, and the annual depreciation rate is 3%. Based on these assumptions, depreciation expense for the year would be $3, and capital expenditures are assumed to be $3.10, which was developed assuming that 3% of the rate base would be replaced, and the cost of replacement would escalate by 3% per year. The end of year rate base in this example, then, is $100.10. The current return produced on this rate base is the beginning of year rate base multiplied by the 10% rate of return, or $10. Hence, the total return on the original cost methodology is $10, or 10%.

In column 2, I show the compensation to investors using a fair value methodology. Here, again, investors' compensation is 10%. In the fair value methodology the beginning of year rate base is $100, the fair value rate of return is 7%, and the asset escalation is 3%. Depreciation expense then would be $3.10, which is the original cost depreciation expense adjusted by the growth in the value of the asset. Capital expenditures are again $3.10. Year-end rate base is $103, which reflects the 3% escalation to the value of the beginning of year rate base. In a fair value methodology, investor compensation is based on the current return of $7, appreciation in the value of rate base is $3, for a total investor return of $10, or 10%.

TABLE 12

Original Cost and Fair Value Comparison

Description	Original Cost (1)	Fair Value (2)
Beginning Rate Base	$100	$100
Rate of Return	10%	7%
Asset Escalation	3%	3%
Depreciation Expense (3%)	$3.0	$3.1
Capital Expenditures	$3.1	$3.1
Year-End Rate Base	$100.1	$103.0
Current Return	$10	$ 7
Asset Appreciation	$ 0	$ 3
Total Return	$10	$10
Total Return (%)	$10 (10%)	$10 (10%)

Q **DO YOU HAVE ANY COMMENTS ON MR. SNOOK'S DEVELOPMENT OF A 5.84% ROR-FVRB?**

A Yes. If the Commission chooses to rely on Mr. Snook's 's analysis for adding a Fair Value Increment to the ROR-OCRB, I recommend the ROR-FVRB be updated to reflect more accurate estimates of the current market cost of equity as described above.

Q **WHAT IS THE FAIR VALUE ROR APPLYING THE COMMISSION APPROVED METHODOLOGY AS DESCRIBED ABOVE?**

A Using a Fair Value Increment of 0.55% as developed above, produces an ROR-FVRB of 5.01%, as developed on Exhibit MPG-2, and a Fair Value Increment revenue requirement adder of $28.58 million.

Q **DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

A Yes, it does.

Qualifications of Michael P. Gorman

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A Michael P. Gorman. My business address is 16690 Swingley Ridge Road, Suite 140, Chesterfield, MO 63017.

Q PLEASE STATE YOUR OCCUPATION.

A I am a consultant in the field of public utility regulation and a Managing Principal with the firm of Brubaker & Associates, Inc. ("BAI"), energy, economic and regulatory consultants.

Q PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.

A In 1983 I received a Bachelors of Science Degree in Electrical Engineering from Southern Illinois University, and in 1986, I received a Masters Degree in Business Administration with a concentration in Finance from the University of Illinois at Springfield. I have also completed several graduate level economics courses.

In August of 1983, I accepted an analyst position with the Illinois Commerce Commission ("ICC"). In this position, I performed a variety of analyses for both formal and informal investigations before the ICC, including: marginal cost of energy, central dispatch, avoided cost of energy, annual system production costs, and working capital. In October of 1986, I was promoted to the position of Senior Analyst. In this position, I assumed the additional responsibilities of technical leader on projects, and my areas of responsibility were expanded to include utility financial modeling and financial analyses.

In 1987, I was promoted to Director of the Financial Analysis Department. In this position, I was responsible for all financial analyses conducted by the Staff. Among other things, I conducted analyses and sponsored testimony before the ICC on rate of return, financial integrity, financial modeling and related issues. I also supervised the development of all Staff analyses and testimony on these same issues. In addition, I supervised the Staff's review and recommendations to the Commission concerning utility plans to issue debt and equity securities.

In August of 1989, I accepted a position with Merrill-Lynch as a financial consultant. After receiving all required securities licenses, I worked with individual investors and small businesses in evaluating and selecting investments suitable to their requirements.

In September of 1990, I accepted a position with Drazen-Brubaker & Associates, Inc. ("DBA"). In April 1995, the firm of Brubaker & Associates, Inc. was formed. It includes most of the former DBA principals and Staff. Since 1990, I have performed various analyses and sponsored testimony on cost of capital, cost/benefits of utility mergers and acquisitions, utility reorganizations, level of operating expenses and rate base, cost of service studies, and analyses relating to industrial jobs and economic development. I also participated in a study used to revise the financial policy for the municipal utility in Kansas City, Kansas.

At BAI, I also have extensive experience working with large energy users to distribute and critically evaluate responses to requests for proposals ("RFPs") for electric, steam, and gas energy supply from competitive energy suppliers. These analyses include the evaluation of gas supply and delivery charges, cogeneration and/or combined cycle unit feasibility studies, and the evaluation of third-party asset/supply management agreements. I have participated in rate cases on rate design and class cost of service for electric, natural gas, water and wastewater utilities. I have also analyzed commodity pricing indices and forward pricing methods for third party supply agreements, and have also conducted regional electric market price forecasts.

In addition to our main office in St. Louis, the firm also has branch offices in Phoenix, Arizona and Corpus Christi, Texas.

Q HAVE YOU EVER TESTIFIED BEFORE A REGULATORY BODY?

A Yes. I have sponsored testimony on cost of capital, revenue requirements, cost of service and other issues before the Federal Energy Regulatory Commission and numerous state regulatory commissions including: Arkansas, Arizona, California, Colorado, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Mississippi, Missouri, Montana, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming, and before the provincial regulatory boards in Alberta and Nova Scotia, Canada. I have also sponsored testimony before the Board of Public Utilities in Kansas City, Kansas; presented rate setting position reports to the regulatory board of the municipal utility in Austin, Texas, and Salt River Project, Arizona, on behalf of industrial customers; and negotiated rate disputes for industrial customers of the Municipal Electric Authority of Georgia in the LaGrange, Georgia district.

Q PLEASE DESCRIBE ANY PROFESSIONAL REGISTRATIONS OR ORGANIZATIONS TO WHICH YOU BELONG.

A I earned the designation of Chartered Financial Analyst ("CFA") from the CFA Institute. The CFA charter was awarded after successfully completing three examinations which covered the subject areas of financial accounting, economics, fixed income and equity valuation and professional and ethical conduct. I am a member of the CFA Institute's Financial Analyst Society.

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Exhibit MPG-1
Page 1 of 2

Arizona Public Service Company

Development of Gross Revenue Requirement Increase

($ Thousands)

		APS Proposed	
Line	**Description**	**Original Cost**	**Fair Value**
1	Adjusted Rate Base	$ 6,771,151	$ 9,976,023
2	Adjusted Operating Income	$ 314,303	$ 314,303
3	Current Rate of Return	4.64%	3.15%
4	Required Operating Income	$ 550,495	$ 582,600
5	Required Rate of Return	8.13%	5.84%
6	Operating Income Deficiency	$ 236,192	$ 268,297
7	Gross Revenue Conversion Factor	1.6155	1.6155
8	Increase in Gross Revenue Requirement	$ 381,568	$ 433,434
9	Fair Value Increment	$ 51,866	
10	ROR Increment	0.474%	

Source:
Leland Snook, Attachment LRS-3DR page 1.

Exhibit MPG-1
page 2 of 2

Arizona Public Service Company

Rate of Return

(December 31, 2015)

		APS Proposed				
Line	**Description**		**Amount** **(1)**	**Weight** **(2)**	**Cost** **(3)**	**Weighted Cost** **(4)**
	Adjusted Long-term Capital Structure					
1	Long-Term Debt	$	3,728,555	44.20%	5.13%	2.27%
2	Common Equity	$	4,706,351	55.80%	**10.50%**	5.86%
3	**Total**	**$**	**8,434,906**	**100.00%**		**8.13%**
	Capital Structure with 1.0% Fair Value Increment					
4	Long-Term Debt	$	2,992,849	30.00%	5.13%	1.54%
5	Common Equity	$	3,778,302	37.87%	**10.50%**	3.98%
6	FVRB Increment	$	3,204,872	32.13%	**1.00%**	0.32%
7	**Total**	**$**	**9,976,023**	**100.00%**		**5.84%**

Source:
Attachment LRS - 3RD.

Arizona Public Service Company

Development of Gross Revenue Requirement Increase

($ Thousands)

		Gorman Recommended	
Line	**Description**	**Original Cost**	**Fair Value**
1	Adjusted Rate Base	$ 6,771,151	$ 9,976,023
2	Adjusted Operating Income	$ 321,979	$ 321,979
3	Current Rate of Return	4.76%	3.23%
4	Required Operating Income	$ 482,106	$ 499,799
5	Required Rate of Return	7.12%	5.01%
6	Operating Income Deficiency	$ 160,127	$ 177,820
7	Gross Revenue Conversion Factor	1.6155	1.6155
8	Increase in Gross Revenue Requirement	$ 258,685	$ 287,268
9	Fair Value Increment	$ 28,583	
10	ROR Increment	0.261%	

Source:
Leland Snook, Attachment LRS-3DR page 1.

Exhibit MPG-2

Arizona Public Service Company

Rate of Return

(December 31, 2015)

		Gorman Recommended			
Line	**Description**	**Amount** (1)	**Weight** (2)	**Cost** (3)	**Weighted Cost** (4)
	Adjusted Long-term Capital Structure				
1	Long-Term Debt	$4,203,905	50.00%	5.13%	2.57%
2	Common Equity	$4,203,905	50.00%	**9.10%**	4.55%
3	**Total**	**$8,407,809**	**100.00%**		**7.12%**
	Capital Structure with 1.0% Fair Value Increment				
4	Long-Term Debt	$3,385,576	33.94%	5.13%	1.74%
5	Common Equity	$3,385,576	33.94%	**9.10%**	3.09%
6	FVRB Increment	$3,204,872	32.13%	**0.55%**	0.18%
7	**Total**	**$9,976,023**	**100.01%**		**5.01%**

Source:
Attachment LRS - 3RD.

Exhibit MPG-3
Page 1 of 3

Arizona Public Service Company

Valuation Metrics

		Price to Earnings (P/E) Ratio [1]															
Line	Company	15-Year Average (1)	2016 [2] (2)	2015 (3)	2014 (4)	2013 (5)	2012 (6)	2011 (7)	2010 (8)	2009 (9)	2008 (10)	2007 (11)	2006 (12)	2005 (13)	2004 (14)	2003 (15)	2002 (16)
1	ALLETE	17.01	19.30	15.06	17.23	18.59	15.88	14.66	15.98	16.08	13.95	14.78	16.55	17.91	25.21	N/A	N/A
2	Alliant Energy	15.31	19.90	18.07	16.60	15.28	14.50	14.45	12.47	13.86	13.43	15.08	16.82	12.59	14.00	12.69	19.93
3	Ameren Corp.	15.15	19.00	17.55	16.71	16.52	13.35	11.93	9.66	9.26	14.21	17.45	19.39	16.72	16.28	13.51	15.78
4	American Electric Power	13.54	16.20	15.77	15.88	14.49	13.77	11.92	13.42	10.03	13.06	16.27	12.91	13.70	12.42	10.66	12.68
5	Avangrid, Inc.	29.12	17.30	40.94	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	Avista Corp.	17.66	19.60	17.60	17.28	14.64	19.30	14.08	12.74	11.42	14.97	30.88	15.39	19.45	24.43	13.84	19.27
7	Black Hills	17.45	21.00	16.14	19.03	18.24	17.13	31.13	18.10	9.93	N/A	15.02	15.77	17.27	17.13	15.95	12.52
8	CenterPoint Energy	14.45	22.80	18.10	16.96	18.75	14.85	14.58	13.78	11.81	11.27	15.00	10.27	19.06	17.84	6.05	5.59
9	CMS Energy Corp.	16.29	20.30	18.29	17.30	16.32	15.07	13.62	12.46	13.56	10.87	26.84	22.18	12.60	12.39	N/A	N/A
10	Consol. Edison	14.90	18.50	15.59	15.90	14.72	15.39	15.08	13.30	12.55	12.29	13.78	15.49	15.13	18.21	14.30	13.28
11	Dominion Resources	17.63	19.20	22.14	22.97	19.25	18.91	17.27	14.35	12.74	13.78	20.63	15.98	24.89	15.07	15.24	12.05
12	DTE Energy	15.07	18.70	18.11	14.91	17.92	14.89	13.51	12.27	10.41	14.81	18.27	17.43	13.80	16.04	13.69	11.28
13	Duke Energy	16.21	17.90	18.22	17.91	17.45	17.46	13.76	12.69	13.32	17.28	16.13	N/A	N/A	N/A	N/A	N/A
14	Edison Int'l	13.71	18.10	14.77	13.05	12.70	9.71	11.81	10.32	9.72	12.36	16.03	12.99	11.74	37.59	6.97	7.78
15	El Paso Electric	16.74	17.90	18.33	16.38	15.88	14.47	12.60	10.72	10.79	11.89	15.26	16.92	26.72	22.03	18.26	22.99
16	Empire District Electric	18.27	25.40	18.71	16.21	15.00	15.76	15.76	16.75	14.34	17.26	21.70	15.92	24.50	24.81	15.83	16.18
17	Entergy Corp.	13.37	11.30	12.53	12.89	13.21	11.22	9.06	11.57	11.98	16.56	19.30	14.28	16.28	15.09	13.77	11.53
18	Eversource Energy	17.37	17.50	18.11	17.92	16.94	19.86	15.35	13.42	11.96	13.66	18.75	27.07	19.76	20.77	13.35	16.07
19	Exelon Corp.	14.08	13.00	12.58	16.02	13.43	19.08	11.30	10.97	11.49	17.97	18.22	16.53	15.37	12.99	11.77	10.46
20	FirstEnergy Corp.	17.80	17.80	17.02	39.79	13.06	21.10	22.39	11.75	13.02	15.64	15.59	14.23	16.07	14.13	22.47	12.95
21	Great Plains Energy	15.72	21.00	19.37	16.47	14.19	15.53	16.11	12.10	16.03	20.55	16.35	18.30	13.96	12.59	12.23	11.09
22	Hawaiian Elec.	17.77	13.00	20.40	15.88	16.21	15.81	17.09	18.59	19.79	23.16	21.57	20.33	18.27	19.18	13.76	13.47
23	IDACORP, Inc.	15.60	18.90	16.22	14.67	13.45	12.41	11.54	11.83	10.20	13.93	18.19	15.07	16.70	15.49	26.51	18.88
24	ITC Holdings	25.13	23.90	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	26.37	N/A	N/A	N/A
25	MGE Energy	17.37	23.90	20.28	17.19	17.01	17.23	15.82	14.98	15.14	14.22	15.01	15.88	22.40	17.98	17.55	15.96
26	NextEra Energy, Inc.	15.50	21.50	16.89	17.25	16.57	14.43	11.54	10.83	13.42	14.48	18.90	13.65	17.88	13.65	17.88	13.60
27	NorthWestern Corp	16.50	15.10	18.36	16.24	16.86	15.72	12.62	12.90	11.54	13.87	21.74	25.95	17.09	N/A	N/A	N/A
28	OGE Energy	14.65	17.50	17.69	18.27	17.69	15.16	14.37	13.31	10.83	12.41	13.75	13.68	14.95	14.13	11.84	14.12
29	Otter Tail Corp.	24.56	21.80	18.20	18.84	21.12	21.75	47.48	55.10	31.16	30.06	19.02	17.35	15.40	17.34	17.77	16.01
30	PG&E Corp.	16.41	17.30	26.40	15.00	23.67	20.70	15.46	15.80	13.01	12.08	16.85	14.84	15.37	13.81	9.50	N/A
31	Pinnacle West Capital	15.26	18.30	16.04	15.89	15.27	14.35	14.60	12.57	13.74	16.07	14.93	13.69	19.24	15.80	13.96	14.43
32	PNM Resources	17.54	18.90	16.85	18.68	16.13	14.97	14.53	14.05	18.09	N/A	35.65	15.57	17.38	15.02	14.73	15.08
33	Portland General	15.73	18.80	17.71	15.32	16.88	13.98	12.37	12.00	14.40	16.30	11.94	23.35	N/A	N/A	N/A	N/A
34	PPL Corp.	14.18	14.60	13.92	14.08	12.84	10.88	10.52	11.93	25.69	17.64	17.26	14.10	15.12	12.51	10.59	11.06
35	Public Serv. Enterprise	13.05	14.00	12.41	12.61	13.50	12.79	10.40	10.37	10.04	13.65	16.54	17.81	16.74	14.26	10.58	10.00
36	SCANA Corp.	13.97	17.50	14.67	13.68	14.43	14.80	13.67	12.93	11.63	12.67	14.96	15.42	14.44	13.57	13.05	12.17
37	Sempra Energy	14.09	25.80	19.73	21.87	19.68	14.89	11.77	12.60	10.09	11.80	14.01	11.50	11.79	8.65	8.96	8.19
38	Southern Co.	15.73	18.30	15.85	16.04	16.19	16.97	15.85	14.90	13.52	16.13	15.95	16.19	15.92	14.68	14.83	14.63
39	Vectren Corp.	16.67	20.00	17.92	19.98	20.66	15.02	15.83	15.10	12.89	16.79	15.33	18.92	15.11	17.57	14.80	14.16
40	Westar Energy	15.08	21.90	18.45	15.36	14.04	13.43	14.78	12.96	14.95	16.96	14.10	12.18	14.79	17.44	10.78	14.02
41	WEC Energy Group	15.69	20.40	21.33	17.71	16.50	15.76	14.25	14.01	13.35	14.77	16.47	15.97	14.46	17.51	12.43	10.46
42	Xcel Energy Inc.	16.49	17.90	16.54	15.44	15.04	14.82	14.24	14.13	12.66	13.69	16.65	14.80	15.36	13.65	11.62	40.80
43	Average	16.01	18.83	18.02	17.18	16.26	15.58	15.23	14.24	13.51	15.17	17.75	16.43	16.98	16.79	13.78	14.37
44	Median	15.30	18.75	17.71	16.43	16.20	15.04	14.31	12.91	12.82	14.21	16.41	15.88	16.07	15.49	13.69	13.54

Sources:

[1] *The Value Line Investment Survey Investment Analyzer Software*, downloaded on November 30, 2016.

[2] *The Value Line Investment Survey*, September 16, October 28, and November 18, 2016.

Exhibit MPG-3
Page 2 of 3

Arizona Public Service Company

Valuation Metrics

		Market Price to Cash Flow (MP/CF) Ratio[1]															
Line	**Company**	**15-Year Average** (1)	**2016**[2,4] (2)	**2015** (3)	**2014** (4)	**2013** (5)	**2012** (6)	**2011** (7)	**2010** (8)	**2009** (9)	**2008** (10)	**2007** (11)	**2006** (12)	**2005** (13)	**2004** (14)	**2003** (15)	**2002** (16)
1	ALLETE	9.24	8.36	7.49	8.80	9.15	8.18	7.91	8.04	8.51	9.29	10.30	11.06	11.54	11.46	N/A	N/A
2	Alliant Energy	7.05	9.52	8.86	8.40	7.52	7.50	7.21	6.59	6.23	7.49	7.92	8.00	5.09	5.52	4.76	5.20
3	Ameren Corp.	6.72	7.24	6.87	6.95	6.61	5.48	5.02	4.23	4.25	6.35	7.69	8.57	8.57	8.24	6.74	7.96
4	American Electric Power	5.97	7.72	7.09	7.00	6.57	5.93	5.46	5.54	4.71	5.71	6.84	5.54	6.07	5.50	4.69	5.19
5	Avangrid, Inc.	10.15	8.99	11.30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	Avista Corp.	6.33	8.11	6.76	7.30	6.21	6.88	6.40	5.80	4.06	5.12	7.58	5.30	6.58	7.58	5.36	5.90
7	Black Hills	7.36	8.28	8.06	8.81	8.03	6.04	7.85	6.16	4.25	11.26	7.62	6.92	7.57	6.69	6.89	5.92
8	CenterPoint Energy	4.70	6.04	5.75	6.25	6.56	5.15	5.39	4.70	4.05	4.29	5.17	3.94	4.70	4.26	2.08	2.16
9	CMS Energy Corp.	5.21	8.47	7.53	7.13	6.68	6.03	5.41	4.48	3.64	3.45	5.57	4.40	4.04	3.20	2.88	NMF
10	Consol. Edison	8.05	9.32	7.96	7.89	7.77	8.31	8.15	7.39	6.72	6.89	8.31	8.65	8.59	9.31	7.90	7.64
11	Dominion Resources	9.13	11.01	11.84	12.27	10.88	9.92	9.45	8.12	6.98	8.27	8.65	7.81	10.09	7.68	7.51	6.53
12	DTE Energy	5.86	8.66	8.52	6.42	6.65	5.91	5.18	4.69	3.59	4.90	5.73	5.21	5.54	6.00	5.62	5.20
13	Duke Energy	7.48	8.23	7.95	8.12	8.11	9.53	6.56	6.01	5.96	7.13	7.16	N/A	N/A	N/A	N/A	N/A
14	Edison Int'l	5.15	6.54	5.92	5.68	5.46	4.59	4.22	4.11	3.95	5.63	7.01	5.87	5.61	6.84	2.82	2.96
15	El Paso Electric	5.51	7.17	6.47	6.33	6.19	5.78	5.16	4.31	3.98	4.95	6.44	6.25	6.67	4.65	3.90	4.39
16	Empire District Electric	7.69	8.38	7.27	7.29	7.07	6.97	6.43	6.88	6.23	6.94	8.78	8.17	9.20	9.60	8.22	7.93
17	Entergy Corp.	5.83	4.03	4.11	4.21	4.03	4.23	3.90	4.66	5.68	7.96	9.21	7.16	8.76	7.12	6.84	5.57
18	Eversource Energy	6.30	11.04	10.12	10.14	8.08	9.30	6.99	4.97	4.61	4.12	6.18	6.02	3.55	3.78	2.85	2.75
19	Exelon Corp.	6.29	4.30	4.70	5.09	4.61	5.54	5.86	5.10	5.98	9.65	9.89	8.62	7.97	6.29	5.71	4.97
20	FirstEnergy Corp.	6.32	5.48	5.38	7.43	6.15	7.42	7.33	4.49	4.91	7.58	7.89	7.53	6.04	5.15	6.90	5.10
21	Great Plains Energy	6.27	6.98	6.66	6.45	5.73	6.09	5.74	4.49	5.06	7.71	7.13	7.68	6.70	6.52	5.92	5.14
22	Hawaiian Elec.	7.86	7.69	9.25	7.64	8.15	8.05	7.73	7.81	6.96	9.10	7.95	8.47	8.29	8.44	6.12	6.20
23	IDACORP, Inc.	7.64	10.83	9.37	8.59	7.78	7.05	6.64	6.52	5.31	7.10	8.23	7.73	7.55	7.15	7.27	7.53
24	ITC Holdings	13.95	14.24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	13.67	N/A	N/A	N/A
25	MGE Energy	10.35	14.41	12.53	11.42	11.20	10.77	9.48	9.05	8.40	8.42	9.23	9.30	11.73	11.04	10.20	8.09
26	NextEra Energy, Inc.	7.13	10.36	7.93	7.98	7.60	7.58	5.98	5.33	6.09	7.34	9.02	6.51	6.71	6.71	5.97	5.77
27	NorthWestern Corp	7.45	8.79	8.99	9.01	7.61	6.85	5.89	5.79	5.05	5.57	8.45	9.39	7.31	8.13	N/A	N/A
28	OGE Energy	7.42	8.42	9.25	10.65	9.93	7.35	7.48	6.61	5.37	6.43	7.58	7.50	7.04	6.73	5.62	5.39
29	Otter Tail Corp.	8.94	9.00	9.04	9.45	9.58	8.43	9.04	8.07	8.01	11.65	9.53	8.66	8.18	9.01	8.13	8.33
30	PG&E Corp.	6.16	6.75	7.24	5.65	6.84	5.86	5.32	5.42	4.71	4.61	5.84	5.28	5.07	5.13	4.05	14.69
31	Pinnacle West Capital	5.80	7.81	6.91	7.03	6.85	6.34	5.80	5.65	3.84	4.19	4.76	4.48	7.48	5.88	4.80	5.21
32	PNM Resources	6.68	8.49	6.95	7.48	6.47	5.80	4.94	4.58	4.53	7.10	10.67	7.50	7.62	6.84	5.55	5.72
33	Portland General	5.44	7.00	6.73	5.49	6.06	5.08	4.86	4.13	4.63	4.81	5.34	5.74	N/A	N/A	N/A	N/A
34	PPL Corp.	7.32	8.67	8.73	7.32	6.59	5.87	5.98	7.46	8.82	9.17	8.90	7.58	7.57	6.49	5.41	5.30
35	Public Serv. Enterprise	7.13	7.28	6.66	6.48	6.40	6.40	6.03	6.04	6.20	8.46	9.83	8.41	8.59	7.17	6.79	6.24
36	SCANA Corp.	7.04	9.99	8.33	7.50	7.49	7.40	6.75	6.52	5.88	6.38	7.15	7.03	5.40	6.86	6.59	6.36
37	Sempra Energy	7.40	10.95	9.99	10.77	9.37	7.26	6.13	6.53	6.07	7.07	8.61	7.22	6.96	5.16	4.85	4.00
38	Southern Co.	8.29	9.49	8.23	8.42	8.30	8.75	8.22	7.79	7.08	8.18	8.62	8.47	8.41	8.28	8.28	7.83
39	Vectren Corp.	6.85	8.35	7.82	7.57	8.82	5.79	5.81	5.58	5.24	6.90	6.53	7.37	7.06	7.63	7.27	6.92
40	Westar Energy	6.62	10.34	9.05	7.93	7.23	6.71	6.67	5.51	5.32	7.09	6.88	5.81	7.00	6.54	4.24	2.94
41	WEC Energy Group	8.04	10.69	12.90	10.27	9.58	9.24	8.43	8.15	6.87	7.57	7.84	7.27	6.40	6.27	4.91	4.27
42	Xcel Energy Inc.	6.22	7.98	7.62	7.31	7.00	6.85	6.47	6.28	5.43	5.71	6.51	5.54	5.62	5.31	4.27	5.46
43	Average	6.97	8.60	8.05	7.80	7.37	6.96	6.48	5.99	5.58	6.94	7.71	7.13	7.35	6.85	5.77	5.91
44	Median	6.82	8.40	7.93	7.49	7.04	6.85	6.27	5.80	5.35	7.08	7.76	7.37	7.06	6.72	5.66	5.57

Sources:

[1] *The Value Line Investment Survey Investment Analyzer Software*, downloaded on November 30, 2016.

[2] *The Value Line Investment Survey, September 16, October 28, and November 18, 2016.*

Note:

[4] Based on the average of the high and low price for 2016 and the projected 2016 cash flow per share, published in The Value Line Investment Survey, September 16, October 28, and November 18, 2016.

Exhibit MPG-3
Page 3 of 3

Arizona Public Service Company

Valuation Metrics

Line	Company	12-Year Average (1)	Market Price to Book Value (MP/BV) Ratio [1] 2016 [2]* (2)	2015 (3)	2014 (4)	2013 (5)	2012 (6)	2011 (7)	2010 (8)	2009 (9)	2008 (10)	2007 (11)	2006 (12)	2005 (13)
1	ALLETE	1.56	1.49	1.37	1.42	1.51	1.34	1.35	1.28	1.15	1.55	1.89	2.09	2.22
2	Alliant Energy	1.55	1.98	1.86	1.86	1.70	1.57	1.46	1.31	1.04	1.33	1.67	1.52	1.33
3	Ameren Corp.	1.31	1.62	1.46	1.45	1.29	1.18	0.90	0.83	0.78	1.25	1.60	1.62	1.68
4	American Electric Power	1.46	1.68	1.55	1.54	1.40	1.31	1.23	1.23	1.08	1.48	1.85	1.56	1.57
5	Avangrid, Inc.	0.78	0.84	0.72	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	Avista Corp.	1.23	1.56	1.36	1.33	1.25	1.21	1.19	1.07	0.94	1.11	1.29	1.30	1.13
7	Black Hills	1.41	1.81	1.59	1.79	1.62	1.21	1.14	1.07	0.83	1.22	1.57	1.47	1.63
8	CenterPoint Energy	2.38	2.57	2.43	2.27	2.30	1.99	1.87	1.96	1.77	2.49	3.13	2.75	3.06
9	CMS Energy Corp.	1.78	2.71	2.43	2.26	2.09	1.91	1.66	1.48	1.10	1.23	1.82	1.42	1.32
10	Consol. Edison	1.37	1.55	1.42	1.34	1.38	1.47	1.38	1.22	1.08	1.17	1.47	1.47	1.52
11	Dominion Resources	2.63	3.00	3.34	3.55	2.97	2.84	2.37	2.01	1.80	2.42	2.69	2.07	2.50
12	DTE Energy	1.35	1.76	1.65	1.62	1.51	1.35	1.20	1.16	0.89	1.10	1.35	1.29	1.39
13	Duke Energy	1.15	1.37	1.29	1.28	1.19	1.12	1.11	1.00	0.91	1.06	1.15	N/A	N/A
14	Edison Int'l	1.59	1.86	1.76	1.68	1.57	1.53	1.24	1.07	1.04	1.56	2.05	1.80	1.93
15	El Paso Electric	1.50	1.65	1.48	1.52	1.49	1.59	1.64	1.17	0.98	1.33	1.69	1.71	1.76
16	Empire District Electric	1.34	1.63	1.32	1.39	1.27	1.23	1.25	1.24	1.07	1.30	1.47	1.45	1.49
17	Entergy Corp.	1.68	1.33	1.40	1.33	1.21	1.31	1.35	1.62	1.66	2.44	2.65	1.89	2.01
18	Eversource Energy	1.37	1.63	1.53	1.47	1.38	1.28	1.50	1.31	1.12	1.31	1.60	1.22	1.05
19	Exelon Corp.	2.45	1.14	1.14	1.28	1.17	1.46	1.95	2.07	2.57	4.39	4.79	3.89	3.60
20	FirstEnergy Corp.	1.57	1.24	1.16	1.15	1.28	1.44	1.33	1.36	1.54	2.52	2.23	1.92	1.64
21	Great Plains Energy	1.20	1.22	1.12	1.11	1.02	0.96	0.93	0.87	0.80	1.11	1.66	1.77	1.86
22	Hawaiian Elec.	1.59	1.64	1.71	1.49	1.54	1.62	1.54	1.44	1.16	1.61	1.57	2.01	1.78
23	IDACORP, Inc.	1.28	1.74	1.54	1.45	1.33	1.19	1.17	1.13	0.92	1.09	1.26	1.37	1.22
24	ITC Holdings	3.48	3.43	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.52
25	MGE Energy	1.90	2.42	2.10	2.10	2.06	1.92	1.75	1.65	1.54	1.62	1.75	1.83	2.09
26	NextEra Energy, Inc.	1.92	2.24	2.09	2.15	1.93	1.74	1.55	1.49	1.70	2.06	2.34	1.80	1.93
27	NorthWestern Corp	1.43	1.69	1.60	1.54	1.56	1.42	1.35	1.22	1.07	1.15	1.48	1.65	1.42
28	OGE Energy	1.83	1.63	1.79	2.22	2.24	1.94	1.90	1.70	1.37	1.52	1.98	1.91	1.80
29	Otter Tail Corp.	1.66	1.81	1.78	1.90	1.96	1.58	1.35	1.19	1.18	1.71	1.93	1.76	1.74
30	PG&E Corp.	1.58	1.64	1.57	1.39	1.38	1.41	1.46	1.56	1.41	1.50	1.94	1.83	1.84
31	Pinnacle West Capital	1.30	1.70	1.52	1.44	1.47	1.39	1.25	1.14	0.95	1.00	1.26	1.26	1.25
32	PNM Resources	1.05	1.44	1.33	1.21	1.09	0.98	0.80	0.69	0.56	0.66	1.23	1.21	1.45
33	Portland General	1.22	1.53	1.42	1.37	1.28	1.14	1.09	0.94	0.92	1.05	1.32	1.36	N/A
34	PPL Corp.	2.13	2.26	2.24	1.64	1.55	1.58	1.47	1.61	2.10	3.19	3.05	2.43	2.50
35	Public Serv. Enterprise	1.93	1.64	1.58	1.57	1.44	1.46	1.59	1.67	1.78	2.58	2.99	2.46	2.45
36	SCANA Corp.	1.49	1.71	1.47	1.48	1.48	1.48	1.36	1.33	1.20	1.45	1.62	1.64	1.72
37	Sempra Energy	1.72	2.10	2.17	2.20	1.84	1.53	1.28	1.35	1.32	1.60	1.87	1.70	1.73
38	Southern Co.	2.04	1.76	1.99	2.02	2.04	2.15	1.99	1.83	1.73	2.12	2.24	2.23	2.35
39	Vectren Corp.	1.75	2.15	2.11	2.08	1.82	1.57	1.53	1.41	1.34	1.64	1.74	1.77	1.82
40	Westar Energy	1.31	1.86	1.49	1.44	1.33	1.26	1.20	1.10	0.93	1.10	1.36	1.30	1.41
41	WEC Energy Group	1.83	2.07	1.82	2.34	2.21	2.05	1.81	1.65	1.40	1.57	1.77	1.71	1.62
42	Xcel Energy Inc.	1.47	1.86	1.66	1.55	1.50	1.51	1.41	1.32	1.19	1.30	1.53	1.40	1.38
43	Average	1.62	1.81	1.67	1.68	1.59	1.50	1.42	1.34	1.25	1.62	1.90	1.76	1.84
44	Median	1.51	1.69	1.57	1.53	1.49	1.46	1.35	1.31	1.14	1.46	1.71	1.71	1.73

Sources:

[1] *The Value Line Investment Survey Investment Analyzer Software*, downloaded on November 30, 2016.

[2] *The Value Line Investment Survey, September 16, October 28, and November 18, 2016.*

Note:

* Based on the average of the high and low price for 2016 and the projected 2016 cash flow per share.

Exhibit MPG-4

Arizona Public Service Company

Actual Historical Capital Structure

Panel A: Regulatory Capital Structure[1]

Line	Description	12/31/2011	12/31/2012	12/31/2013	12/31/2014	12/31/2015
1	Long-Term Debt	$ 3,296,834	$ 3,156,099	$ 3,199,180	$ 3,303,943	$ 3,751,563
2	Common Equity	3,943,007	4,093,001	4,308,885	4,478,245	4,679,255
3	**Total**	**$ 7,239,841**	**$ 7,249,100**	**$ 7,508,065**	**$ 7,782,188**	**$ 8,430,818**
4	Long-Term Debt	45.54%	43.54%	42.61%	42.46%	44.50%
5	Common Equity	54.46%	56.46%	57.39%	57.54%	55.50%
6	**Total**	100.00%	100.00%	100.00%	100.00%	100.00%

Panel B: Financial Capital Structure[2]

Line	Description	12/31/2011	12/31/2012	12/31/2013	12/31/2014	12/31/2015
7	Short-Term Debt	$ 477,435	$ 215,003	$ 693,549	$ 530,970	$ 357,580
8	Long-Term Debt	$ 2,894,054	$ 3,074,088	$ 2,671,465	$ 2,906,215	$ 3,337,391
9	Total Debt	$ 3,371,489	$ 3,289,091	$ 3,365,014	$ 3,437,185	$ 3,694,971
9	Common Equity	$ 4,051,406	$ 4,222,483	$ 4,308,884	$ 4,478,243	$ 4,679,254
10	**Total**	**$ 7,422,895**	**$ 7,511,574**	**$ 7,673,898**	**$ 7,915,428**	**$ 8,374,225**
11	Short-Term Debt	6.43%	2.86%	9.04%	6.71%	4.27%
12	Long-Term Debt	38.99%	40.92%	34.81%	36.72%	39.85%
13	Total Debt	45.42%	43.79%	43.85%	43.42%	44.12%
14	Common Equity	54.58%	56.21%	56.15%	56.58%	55.88%
15	**Total**	100.00%	100.00%	100.00%	100.00%	100.00%
16	**Off-Balance Sheet Debt Adjustments**					
17	OLA Debt	$ 59,467	$ 62,787	$ 64,839	$ 51,708	$ 56,874
18	Surplus cash	$ (14,900)	$ (2,620)	$ (2,790)	$ (4,520)	$ (22,060)
19	Purchase Power Debt Equivalent	$ 251,918	$ 251,918	$ 251,918	$ 102,700	$ 84,300
20	Pension & Other Debt/Deferred Comp.	$ 836,555	$ 700,610	$ 340,917	$ 202,120	$ 198,271
21	Accrued Int. Not Incl. in Pre-Adj. Debt	$ 54,611	$ 49,135	$ 48,132	$ 52,358	$ 56,003
22	Total	$ 1,187,651	$ 1,061,830	$ 703,016	$ 404,366	$ 373,388
23	Adjusted Debt	$ 4,559,140	$ 4,350,921	$ 4,068,030	$ 3,841,551	$ 4,068,359
24	Common Equity	$ 4,051,406	$ 4,222,483	$ 4,308,884	$ 4,478,243	$ 4,679,254
25	**Total**	**$ 8,610,546**	**$ 8,573,404**	**$ 8,376,914**	**$ 8,319,794**	**$ 8,747,613**
26	Adjusted Debt	52.95%	50.75%	48.56%	46.17%	46.51%
27	Common Equity	47.05%	49.25%	51.44%	53.83%	53.49%
28	**Total**	100.00%	100.00%	100.00%	100.00%	100.00%

Sources:

[1] FERC Form 1, as of December 31, 2011-2015.

[2] S&P Credit Portal, downloaded on December 5, 2016.

Exhibit MPG-4

Arizona Public Service Company

Recommended Capital Structure

($ 000)

		APS Proposed		Adjusted Capital Mix	
Line	**Description**	**Amount** **(1)**	**Weight** **(2)**	**Amount** **(3)**	**Weight** **(4)**
Financial					
1	Long-Term Debt	3,728,555		4,203,905	
2	Total OBS Debt	373,388		373,388	
3	Total Adj Debt	4,101,943	**46.7%**	4,577,292	**52.1%**
4	Common Equity	4,679,254	53.3%	4,203,905	47.9%
5	**Total**	**8,781,197**	**100.0%**	**8,781,197**	**100.0%**
Regulatory					
6	Total Long-Term Debt	3,728,555	44.3%	4,203,905	50.0%
7	Common Equity	4,679,254	55.7%	4,203,905	50.0%
8	**Total**	**8,407,809**	**100.0%**	**8,407,809**	**100.0%**

Source:
Schedule D-1 and page 2.

Exhibit MPG-5

Arizona Public Service Company

Proxy Group

Line	Company	Credit Ratings[1]		Common Equity Ratios	
		S&P	Moody's	SNL[1]	Value Line[2]
		(1)	(2)	(3)	(4)
1	ALLETE, Inc.	BBB+	A3	53.3%	53.7%
2	Alliant Energy Corporation	A-	Baa1	46.5%	51.4%
3	Ameren Corporation	BBB+	Baa1	47.4%	49.7%
4	American Electric Power Company, Inc.	BBB+	Baa1	46.3%	50.2%
5	CenterPoint Energy, Inc.	A-	Baa1	28.3%	30.5%
6	CMS Energy Corporation	BBB+	Baa2	29.3%	31.4%
7	Consolidated Edison, Inc.	A-	A3	47.7%	52.1%
8	DTE Energy Company	BBB+	Baa1	47.3%	49.8%
9	Edison International	BBB+	A3	45.0%	46.7%
10	El Paso Electric Company	BBB	Baa1	44.6%	47.3%
11	Entergy Corporation	BBB+	Baa3	39.5%	40.8%
12	IDACORP, Inc.	BBB	Baa1	54.0%	54.4%
13	OGE Energy Corp.	A-	A3	54.8%	55.7%
14	PG&E Corporation	BBB+	Baa1	48.8%	50.4%
15	Pinnacle West Capital Corporation	A-	A3	53.7%	57.0%
16	Portland General Electric Company	BBB	A3	50.7%	52.2%
17	Public Service Enterprise Group Incorporat	BBB+	Baa2	56.8%	59.7%
18	SCANA Corporation	BBB+	Baa3	45.5%	48.1%
19	Sempra Energy	BBB+	Baa1	43.3%	47.3%
20	Vectren Corporation	A-	N/A	48.3%	49.4%
21	Xcel Energy Inc.	A-	A3	43.3%	45.9%
22	**Average**	**BBB+**	**Baa1**	**46.4%**	**48.7%**
23	**Median**			**47.3%**	**49.8%**
24	**Arizona Public Service Company**	**A-**[3]	**A2**[3]		**50.0%**[4]

Sources:

[1] SNL Financial, Downloaded on November 21, 2016.

[2] *The Value Line Investment Survey*, September 16, October 28, and November 18, 2016.

[3] Villadsen Direct testimony at 10.

[4] Exhibit MPG-4, Page 2 of 2.

Exhibit MPG-6

Arizona Public Service Company

Consensus Analysts' Growth Rates

		Zacks		SNL		Reuters		Average of
Line	Company	Estimated Growth %[1] (1)	Number of Estimates (2)	Estimated Growth %[2] (3)	Number of Estimates (4)	Estimated Growth %[3] (5)	Number of Estimates (6)	Growth Rates (7)
1	ALLETE, Inc.	5.50%	N/A	6.00%	1	5.00%	1	5.50%
2	Alliant Energy Corporation	6.10%	N/A	7.90%	1	6.60%	2	6.87%
3	Ameren Corporation	6.50%	N/A	7.00%	2	5.60%	2	6.37%
4	American Electric Power Company, Inc.	5.40%	N/A	3.10%	5	1.89%	1	3.46%
5	CenterPoint Energy, Inc.	5.50%	N/A	4.80%	4	5.73%	3	5.34%
6	CMS Energy Corporation	6.60%	N/A	6.90%	3	7.26%	2	6.92%
7	Consolidated Edison, Inc.	2.80%	N/A	2.30%	3	2.12%	3	2.41%
8	DTE Energy Company	5.80%	N/A	5.40%	4	5.63%	3	5.61%
9	Edison International	5.30%	N/A	6.30%	2	1.93%	1	4.51%
10	El Paso Electric Company	4.40%	N/A	N/A	N/A	N/A	N/A	4.40%
11	Entergy Corporation	- 4.80%	N/A	- 1.70%	4	- 8.34%	2	N/A
12	IDACORP, Inc.	4.30%	N/A	4.40%	2	4.10%	2	4.27%
13	OGE Energy Corp.	5.20%	N/A	5.40%	2	4.00%	1	4.87%
14	PG&E Corporation	4.30%	N/A	5.20%	4	5.58%	5	5.03%
15	Pinnacle West Capital Corporation	4.50%	N/A	4.70%	5	4.45%	2	4.55%
16	Portland General Electric Company	6.20%	N/A	5.70%	3	6.20%	2	6.03%
17	Public Service Enterprise Group Incorporated	4.40%	N/A	1.50%	3	1.23%	2	2.38%
18	SCANA Corporation	5.50%	N/A	6.10%	3	6.50%	2	6.03%
19	Sempra Energy	6.90%	N/A	11.40%	2	7.65%	2	8.65%
20	Vectren Corporation	5.30%	N/A	5.00%	2	4.57%	3	4.96%
21	Xcel Energy Inc.	5.40%	N/A	5.10%	4	5.72%	2	5.41%
22	**Average**	**5.30%**	**N/A**	**5.48%**	**3**	**4.83%**	**2**	**5.18%**

Sources:

[1] Zacks Elite, http://www.zackselite.com/, downloaded on November 18, 2016.

[2] SNL Interactive, http://www.snl.com/, downloaded on November 18, 2016.

[3] Reuters, http://www.reuters.com/, downloaded on November 18, 2016.

Exhibit MPG-7

Arizona Public Service Company

Constant Growth DCF Model

(Consensus Analysts' Growth Rates)

Line	Company	13-Week AVG Stock Price[1] (1)	Analysts' Growth[2] (2)	Annualized Dividend[3] (3)	Adjusted Yield (4)	Constant Growth DCF (5)
1	ALLETE, Inc.	$59.58	5.50%	$2.08	3.68%	9.18%
2	Alliant Energy Corporation	$37.69	6.87%	$1.18	3.35%	10.21%
3	Ameren Corporation	$49.10	6.37%	$1.70	3.68%	10.05%
4	American Electric Power Company, Inc.	$63.52	3.46%	$2.24	3.65%	7.11%
5	CenterPoint Energy, Inc.	$22.86	5.34%	$1.03	4.75%	10.09%
6	CMS Energy Corporation	$41.62	6.92%	$1.24	3.19%	10.11%
7	Consolidated Edison, Inc.	$74.13	2.41%	$2.68	3.70%	6.11%
8	DTE Energy Company	$93.33	5.61%	$3.08	3.49%	9.10%
9	Edison International	$71.87	4.51%	$1.92	2.79%	7.30%
10	El Paso Electric Company	$45.30	4.40%	$1.24	2.86%	7.26%
11	Entergy Corporation	$75.28	N/A	$3.40	N/A	N/A
12	IDACORP, Inc.	$76.59	4.27%	$2.20	2.99%	7.26%
13	OGE Energy Corp.	$31.06	4.87%	$1.10	3.71%	8.58%
14	PG&E Corporation	$61.22	5.03%	$1.96	3.36%	8.39%
15	Pinnacle West Capital Corporation	$75.14	4.55%	$2.50	3.48%	8.03%
16	Portland General Electric Company	$42.33	6.03%	$1.28	3.21%	9.24%
17	Public Service Enterprise Group Incorporated	$41.76	2.38%	$1.64	4.02%	6.40%
18	SCANA Corporation	$71.13	6.03%	$2.30	3.43%	9.46%
19	Sempra Energy	$104.41	8.65%	$3.02	3.14%	11.79%
20	Vectren Corporation	$49.11	4.96%	$1.60	3.42%	8.38%
21	Xcel Energy Inc.	$40.85	5.41%	$1.36	3.51%	8.92%
22	**Average**	**$58.47**	**5.18%**	**$1.94**	**3.47%**	**8.65%**
23	**Median**					**8.75%**

Sources:

[1] SNL Financial, Downloaded on November 21, 2016.

[2] Exhibit MPG-3.

[3] *The Value Line Investment Survey*, September 16, October 28, and November 18, 2016.

Exhibit MPG-8

Arizona Public Service Company

Payout Ratios

		Dividends Per Share		Earnings Per Share		Payout Ratio	
Line	Company	2015 (1)	Projected (2)	2015 (3)	Projected (4)	2015 (5)	Projected (6)
1	ALLETE, Inc.	$2.02	$2.40	$3.38	$3.75	59.76%	64.00%
2	Alliant Energy Corporation	$1.10	$1.50	$1.69	$2.45	65.09%	61.22%
3	Ameren Corporation	$1.66	$2.05	$2.38	$3.25	69.75%	63.08%
4	American Electric Power Company, Inc.	$2.15	$2.75	$3.59	$4.25	59.89%	64.71%
5	CenterPoint Energy, Inc.	$0.99	$1.19	$1.08	$1.40	91.67%	85.00%
6	CMS Energy Corporation	$1.16	$1.60	$1.89	$2.50	61.38%	64.00%
7	Consolidated Edison, Inc.	$2.60	$3.00	$4.05	$4.50	64.20%	66.67%
8	DTE Energy Company	$2.84	$3.70	$4.45	$6.25	63.82%	59.20%
9	Edison International	$1.73	$2.60	$4.15	$5.00	41.69%	52.00%
10	El Paso Electric Company	$1.17	$1.65	$2.03	$2.75	57.64%	60.00%
11	Entergy Corporation	$3.34	$4.00	$5.81	$6.25	57.49%	64.00%
12	IDACORP, Inc.	$1.92	$2.70	$3.87	$4.50	49.61%	60.00%
13	OGE Energy Corp.	$1.05	$1.65	$1.69	$2.25	62.13%	73.33%
14	PG&E Corporation	$1.82	$2.70	$2.00	$4.50	91.00%	60.00%
15	Pinnacle West Capital Corporation	$2.44	$3.10	$3.92	$4.75	62.24%	65.26%
16	Portland General Electric Company	$1.18	$1.60	$2.04	$2.75	57.84%	58.18%
17	Public Service Enterprise Group Incorporated	$1.56	$2.00	$3.30	$3.25	47.27%	61.54%
18	SCANA Corporation	$2.18	$2.80	$3.81	$4.75	57.22%	58.95%
19	Sempra Energy	$2.80	$4.00	$5.23	$7.50	53.54%	53.33%
20	Vectren Corporation	$1.54	$1.95	$2.39	$3.35	64.44%	58.21%
21	Xcel Energy Inc.	$1.28	$1.70	$2.10	$2.75	60.95%	61.82%
22	**Average**	**$1.83**	**$2.41**	**$3.09**	**$3.94**	**61.84%**	**62.60%**

Source:
The Value Line Investment Survey, September 16, October 28, and November 18, 2016.

Exhibit MPG-9
Page 1 of 2

Arizona Public Service Company

Sustainable Growth Rate

		3 to 5 Year Projections										Sustainable
Line	**Company**	**Dividends Per Share (1)**	**Earnings Per Share (2)**	**Book Value Per Share (3)**	**Book Value Growth (4)**	**ROE (5)**	**Adjustment Factor (6)**	**Adjusted ROE (7)**	**Payout Ratio (8)**	**Retention Rate (9)**	**Internal Growth Rate (10)**	**Growth Rate (11)**
1	ALLETE, Inc.	$2.40	$3.75	$43.50	3.25%	8.62%	1.02	8.76%	64.00%	36.00%	3.15%	3.52%
2	Alliant Energy Corporation	$1.50	$2.45	$20.00	4.04%	12.25%	1.02	12.49%	61.22%	38.78%	4.84%	5.19%
3	Ameren Corporation	$2.05	$3.25	$34.00	3.50%	9.56%	1.02	9.72%	63.08%	36.92%	3.59%	3.59%
4	American Electric Power Company, Inc.	$2.75	$4.25	$44.25	3.96%	9.60%	1.02	9.79%	64.71%	35.29%	3.46%	3.72%
5	CenterPoint Energy, Inc.	$1.19	$1.40	$9.00	2.26%	15.56%	1.01	15.73%	85.00%	15.00%	2.36%	2.79%
6	CMS Energy Corporation	$1.60	$2.50	$19.25	6.26%	12.99%	1.03	13.38%	64.00%	36.00%	4.82%	6.30%
7	Consolidated Edison, Inc.	$3.00	$4.50	$53.00	3.53%	8.49%	1.02	8.64%	66.67%	33.33%	2.88%	3.59%
8	DTE Energy Company	$3.70	$6.25	$61.00	4.53%	10.25%	1.02	10.47%	59.20%	40.80%	4.27%	4.73%
9	Edison International	$2.60	$5.00	$45.00	5.22%	11.11%	1.03	11.39%	52.00%	48.00%	5.47%	5.47%
10	El Paso Electric Company	$1.65	$2.75	$30.50	3.95%	9.02%	1.02	9.19%	60.00%	40.00%	3.68%	3.90%
11	Entergy Corporation	$4.00	$6.25	$64.00	4.28%	9.77%	1.02	9.97%	64.00%	36.00%	3.59%	3.62%
12	IDACORP, Inc.	$2.70	$4.50	$49.50	3.90%	9.09%	1.02	9.26%	60.00%	40.00%	3.71%	3.85%
13	OGE Energy Corp.	$1.65	$2.25	$19.75	3.46%	11.39%	1.02	11.59%	73.33%	26.67%	3.09%	3.24%
14	PG&E Corporation	$2.70	$4.50	$42.25	4.63%	10.65%	1.02	10.89%	60.00%	40.00%	4.36%	5.42%
15	Pinnacle West Capital Corporation	$3.10	$4.75	$49.00	3.48%	9.69%	1.02	9.86%	65.26%	34.74%	3.42%	3.79%
16	Portland General Electric Company	$1.60	$2.75	$30.25	3.53%	9.09%	1.02	9.25%	58.18%	41.82%	3.87%	4.02%
17	Public Service Enterprise Group Incorporated	$2.00	$3.25	$29.75	2.84%	10.92%	1.01	11.08%	61.54%	38.46%	4.26%	4.28%
18	SCANA Corporation	$2.80	$4.75	$47.75	4.62%	9.95%	1.02	10.17%	58.95%	41.05%	4.18%	4.79%
19	Sempra Energy	$4.00	$7.50	$54.75	2.86%	13.70%	1.01	13.89%	53.33%	46.67%	6.48%	6.48%
20	Vectren Corporation	$1.95	$3.35	$26.15	5.15%	12.81%	1.03	13.13%	58.21%	41.79%	5.49%	6.57%
21	Xcel Energy Inc.	$1.70	$2.75	$25.50	4.07%	10.78%	1.02	11.00%	61.82%	38.18%	4.20%	4.22%
22	**Average**	**$2.41**	**$3.94**	**$38.01**	**3.97%**	**10.73%**	**1.02**	**10.94%**	**62.60%**	**37.40%**	**4.06%**	**4.43%**

Sources and Notes:
Cols. (1), (2) and (3): *The Value Line Investment Survey*, September 16, October 28, and November 18, 2016.
Col. (4): [Col. (3) / Page 2 Col. (2)] ^ (1/5) - 1.
Col. (5): Col. (2) / Col. (3).
Col. (6): [2 * (1 + Col. (4))] / (2 + Col. (4)).
Col. (7): Col. (6) * Col. (5).
Col. (8): Col. (1) / Col. (2).
Col. (9): 1 - Col. (8).
Col. (10): Col. (9) * Col. (7).
Col. (11): Col. (10) + Page 2 Col. (9).

Exhibit MPG-9

Arizona Public Service Company

Sustainable Growth Rate

Line	Company	13-Week Average Stock Price[1] (1)	2015 Book Value Per Share[2] (2)	Market to Book Ratio (3)	Common Shares Outstanding (in Millions)[2] 2015 (4)	Common Shares Outstanding (in Millions)[2] 3-5 Years (5)	Growth (6)	S Factor[3] (7)	V Factor[4] (8)	S * V (9)
1	ALLETE, Inc.	$59.58	$37.07	1.61	49.10	50.60	0.60%	0.97%	37.78%	0.37%
2	Alliant Energy Corporation	$37.69	$16.41	2.30	226.92	230.00	0.27%	0.62%	56.46%	0.35%
3	Ameren Corporation	$49.10	$28.63	1.71	242.63	242.63	0.00%	0.00%	41.69%	0.00%
4	American Electric Power Company, Inc.	$63.52	$36.44	1.74	491.05	500.00	0.36%	0.63%	42.63%	0.27%
5	CenterPoint Energy, Inc.	$22.86	$8.05	2.84	430.00	435.00	0.23%	0.66%	64.78%	0.43%
6	CMS Energy Corporation	$41.62	$14.21	2.93	277.16	288.00	0.77%	2.26%	65.85%	1.49%
7	Consolidated Edison, Inc.	$74.13	$44.55	1.66	293.00	309.00	1.07%	1.78%	39.90%	0.71%
8	DTE Energy Company	$93.33	$48.88	1.91	179.47	184.00	0.50%	0.95%	47.63%	0.45%
9	Edison International	$71.87	$34.89	2.06	325.81	325.81	0.00%	0.00%	51.45%	0.00%
10	El Paso Electric Company	$45.30	$25.13	1.80	40.44	41.00	0.28%	0.50%	44.52%	0.22%
11	Entergy Corporation	$75.28	$51.89	1.45	178.39	179.00	0.07%	0.10%	31.07%	0.03%
12	IDACORP, Inc.	$76.59	$40.88	1.87	50.34	50.75	0.16%	0.30%	46.63%	0.14%
13	OGE Energy Corp.	$31.06	$16.66	1.86	199.70	201.50	0.18%	0.33%	46.36%	0.16%
14	PG&E Corporation	$61.22	$33.69	1.82	492.03	525.00	1.31%	2.37%	44.97%	1.07%
15	Pinnacle West Capital Corporation	$75.14	$41.30	1.82	110.98	113.50	0.45%	0.82%	45.04%	0.37%
16	Portland General Electric Company	$42.33	$25.43	1.66	88.79	89.80	0.23%	0.38%	39.93%	0.15%
17	Public Service Enterprise Group Incorporated	$41.76	$25.86	1.61	505.28	506.00	0.03%	0.05%	38.08%	0.02%
18	SCANA Corporation	$71.13	$38.09	1.87	142.90	148.00	0.70%	1.31%	46.45%	0.61%
19	Sempra Energy	$104.41	$47.56	2.20	248.30	242.00	- 0.51%	- 1.13%	54.45%	- 0.61%
20	Vectren Corporation	$49.11	$20.34	2.41	82.80	86.00	0.76%	1.84%	58.59%	1.08%
21	Xcel Energy Inc.	$40.85	$20.89	1.96	507.54	508.00	0.02%	0.04%	48.86%	0.02%
22	**Average**	**$58.47**	**$31.28**	**1.96**	**245.84**	**250.27**	**0.40%**	**0.80%**	**47.29%**	**0.40%**

Sources and Notes:

[1] SNL Financial, Downloaded on November 21, 2016.

[2] *The Value Line Investment Survey*, September 16, October 28, and November 18, 2016.

[3] Expected Growth in the Number of Shares, Column (3) * Column (6).

[4] Expected Profit of Stock Investment, [1 - 1 / Column (3)].

Exhibit MPG-10

Arizona Public Service Company

Constant Growth DCF Model

(Sustainable Growth Rate)

Line	Company	13-Week AVG Stock Price[1] (1)	Sustainable Growth[2] (2)	Annualized Dividend[3] (3)	Adjusted Yield (4)	Constant Growth DCF (5)
1	ALLETE, Inc.	$59.58	3.52%	$2.08	3.61%	7.13%
2	Alliant Energy Corporation	$37.69	5.19%	$1.18	3.29%	8.49%
3	Ameren Corporation	$49.10	3.59%	$1.70	3.59%	7.18%
4	American Electric Power Company, Inc.	$63.52	3.72%	$2.24	3.66%	7.38%
5	CenterPoint Energy, Inc.	$22.86	2.79%	$1.03	4.63%	7.42%
6	CMS Energy Corporation	$41.62	6.30%	$1.24	3.17%	9.47%
7	Consolidated Edison, Inc.	$74.13	3.59%	$2.68	3.74%	7.33%
8	DTE Energy Company	$93.33	4.73%	$3.08	3.46%	8.18%
9	Edison International	$71.87	5.47%	$1.92	2.82%	8.29%
10	El Paso Electric Company	$45.30	3.90%	$1.24	2.84%	6.74%
11	Entergy Corporation	$75.28	3.62%	$3.40	4.68%	8.30%
12	IDACORP, Inc.	$76.59	3.85%	$2.20	2.98%	6.83%
13	OGE Energy Corp.	$31.06	3.24%	$1.10	3.66%	6.90%
14	PG&E Corporation	$61.22	5.42%	$1.96	3.38%	8.80%
15	Pinnacle West Capital Corporation	$75.14	3.79%	$2.50	3.45%	7.25%
16	Portland General Electric Company	$42.33	4.02%	$1.28	3.15%	7.16%
17	Public Service Enterprise Group Incorporated	$41.76	4.28%	$1.64	4.10%	8.37%
18	SCANA Corporation	$71.13	4.79%	$2.30	3.39%	8.17%
19	Sempra Energy	$104.41	6.48%	$3.02	3.08%	9.56%
20	Vectren Corporation	$49.11	6.57%	$1.60	3.47%	10.04%
21	Xcel Energy Inc.	$40.85	4.22%	$1.36	3.47%	7.69%
22	**Average**	**$58.47**	**4.43%**	**$1.94**	**3.51%**	**7.94%**
23	**Median**					**7.69%**

Sources:

[1] SNL Financial, Downloaded on November 21, 2016.

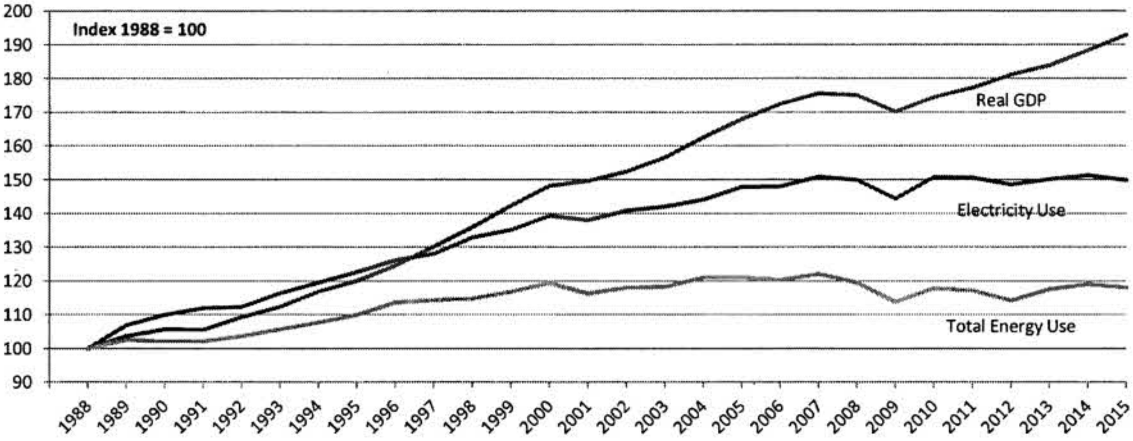
[2] Exhibit MPG-6, page 1.

[3] *The Value Line Investment Survey*, September 16, October 28, and November 18, 2016.

Exhibit MPG-11

Arizona Public Service Company

Electricity Sales Are Linked to U.S. Economic Growth



Note:
1988 represents the base year. Graph depicts increases or decreases from the base year.

Sources:
U.S. Energy Information Administration
Federal Reserve Bank of St. Louis

Exhibit MPG-12

Arizona Public Service Company

Multi-Stage Growth DCF Model

		13-Week AVG	Annualized	First Stage	Second Stage Growth					Third Stage	Multi-Stage
Line	Company	Stock Price[1] (1)	Dividend[2] (2)	Growth[3] (3)	Year 6 (4)	Year 7 (5)	Year 8 (6)	Year 9 (7)	Year 10 (8)	Growth[4] (9)	Growth DCF (10)
1	ALLETE, Inc.	$59.58	$2.08	5.50%	5.29%	5.08%	4.88%	4.67%	4.46%	4.25%	8.19%
2	Alliant Energy Corporation	$37.69	$1.18	6.87%	6.43%	5.99%	5.56%	5.12%	4.69%	4.25%	8.10%
3	Ameren Corporation	$49.10	$1.70	6.37%	6.01%	5.66%	5.31%	4.96%	4.60%	4.25%	8.37%
4	American Electric Power Company, Inc.	$63.52	$2.24	3.46%	3.59%	3.73%	3.86%	3.99%	4.12%	4.25%	7.74%
5	CenterPoint Energy, Inc.	$22.86	$1.03	5.34%	5.16%	4.98%	4.80%	4.61%	4.43%	4.25%	9.27%
6	CMS Energy Corporation	$41.62	$1.24	6.92%	6.48%	6.03%	5.59%	5.14%	4.70%	4.25%	7.93%
7	Consolidated Edison, Inc.	$74.13	$2.68	2.41%	2.71%	3.02%	3.33%	3.64%	3.94%	4.25%	7.59%
8	DTE Energy Company	$93.33	$3.08	5.61%	5.38%	5.16%	4.93%	4.70%	4.48%	4.25%	8.00%
9	Edison International	$71.87	$1.92	4.51%	4.47%	4.42%	4.38%	4.34%	4.29%	4.25%	7.07%
10	El Paso Electric Company	$45.30	$1.24	4.40%	4.38%	4.35%	4.33%	4.30%	4.28%	4.25%	7.12%
11	Entergy Corporation	$75.28	$3.40	N/A	N/A	N/A	N/A	N/A	N/A	4.25%	N/A
12	IDACORP, Inc.	$76.59	$2.20	4.27%	4.26%	4.26%	4.26%	4.26%	4.25%	4.25%	7.24%
13	OGE Energy Corp.	$31.06	$1.10	4.87%	4.76%	4.66%	4.56%	4.46%	4.35%	4.25%	8.09%
14	PG&E Corporation	$61.22	$1.96	5.03%	4.90%	4.77%	4.64%	4.51%	4.38%	4.25%	7.75%
15	Pinnacle West Capital Corporation	$75.14	$2.50	4.55%	4.50%	4.45%	4.40%	4.35%	4.30%	4.25%	7.78%
16	Portland General Electric Company	$42.33	$1.28	6.03%	5.74%	5.44%	5.14%	4.84%	4.55%	4.25%	7.78%
17	Public Service Enterprise Group Incorporate	$41.76	$1.64	2.38%	2.69%	3.00%	3.31%	3.63%	3.94%	4.25%	7.87%
18	SCANA Corporation	$71.13	$2.30	6.03%	5.74%	5.44%	5.14%	4.84%	4.55%	4.25%	8.02%
19	Sempra Energy	$104.41	$3.02	8.65%	7.92%	7.18%	6.45%	5.72%	4.98%	4.25%	8.23%
20	Vectren Corporation	$49.11	$1.60	4.96%	4.84%	4.72%	4.60%	4.49%	4.37%	4.25%	7.80%
21	Xcel Energy Inc.	$40.85	$1.36	5.41%	5.21%	5.02%	4.83%	4.64%	4.44%	4.25%	7.98%
22	**Average**	**$58.47**	**$1.94**	**5.18%**	**5.02%**	**4.87%**	**4.71%**	**4.56%**	**4.40%**	**4.25%**	**7.90%**
23	**Median**										**7.90%**

Sources:

[1] SNL Financial, Downloaded on November 21, 2016.

[2] *The Value Line Investment Survey*, September 16, October 28, and November 18, 2016.

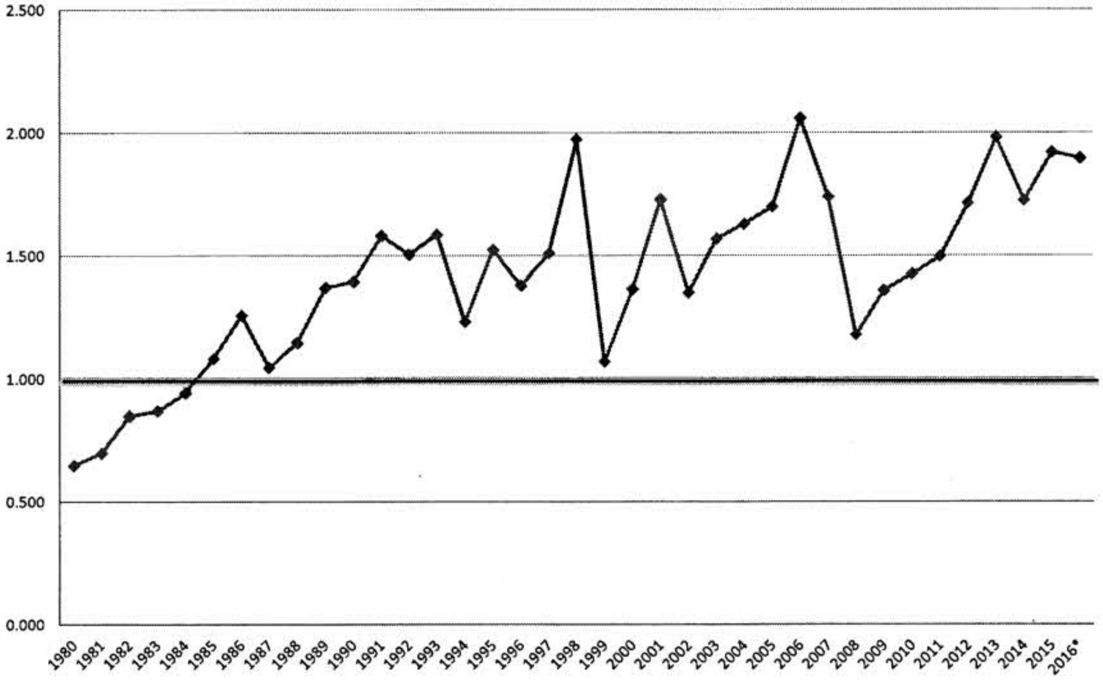
[3] Exhibit MPG-3.

[4] Blue Chip Financial Forecasts, December 1, 2016 at 14.

Exhibit MPG-13

Arizona Public Service Company

Common Stock Market/Book Ratio



* through June 2016

Source:
1980 - 2000: Mergent Public Utility Manual.
2001 - 2016: AUS Utility Reports, various dates.

Exhibit MPG-14

Arizona Public Service Company

Equity Risk Premium - Treasury Bond

Line	Year	Authorized Electric Returns[1] (1)	30 yr. Treasury Bond Yield[2] (2)	Indicated Risk Premium (3)	Rolling 5 - Year Average (4)	Rolling 10 - Year Average (5)
1	1986	13.93%	7.80%	6.13%		
2	1987	12.99%	8.58%	4.41%		
3	1988	12.79%	8.96%	3.83%		
4	1989	12.97%	8.45%	4.52%		
5	1990	12.70%	8.61%	4.09%	4.60%	
6	1991	12.55%	8.14%	4.41%	4.25%	
7	1992	12.09%	7.67%	4.42%	4.26%	
8	1993	11.41%	6.60%	4.81%	4.45%	
9	1994	11.34%	7.37%	3.97%	4.34%	
10	1995	11.55%	6.88%	4.67%	4.46%	4.53%
11	1996	11.39%	6.70%	4.69%	4.51%	4.38%
12	1997	11.40%	6.61%	4.79%	4.59%	4.42%
13	1998	11.66%	5.58%	6.08%	4.84%	4.65%
14	1999	10.77%	5.87%	4.90%	5.03%	4.68%
15	2000	11.43%	5.94%	5.49%	5.19%	4.82%
16	2001	11.09%	5.49%	5.60%	5.37%	4.94%
17	2002	11.16%	5.43%	5.73%	5.56%	5.07%
18	2003	10.97%	4.96%	6.01%	5.55%	5.19%
19	2004	10.75%	5.05%	5.70%	5.71%	5.37%
20	2005	10.54%	4.65%	5.89%	5.79%	5.49%
21	2006	10.34%	4.99%	5.35%	5.74%	5.56%
22	2007	10.31%	4.83%	5.48%	5.69%	5.62%
23	2008	10.37%	4.28%	6.09%	5.70%	5.62%
24	2009	10.52%	4.07%	6.45%	5.85%	5.78%
25	2010	10.29%	4.25%	6.04%	5.88%	5.83%
26	2011	10.19%	3.91%	6.28%	6.07%	5.90%
27	2012	10.01%	2.92%	7.09%	6.39%	6.04%
28	2013	9.81%	3.45%	6.36%	6.44%	6.07%
29	2014	9.75%	3.34%	6.41%	6.44%	6.14%
30	2015	9.60%	2.84%	6.76%	6.58%	6.23%
31	2016 [3]	9.64%	2.52%	7.12%	6.75%	6.41%
32	**Average**	**11.17%**	**5.70%**	**5.47%**	**5.41%**	**5.40%**
33	**Minimum**				**4.25%**	**4.38%**
34	**Maximum**				**6.75%**	**6.41%**

Sources:

[1] *Regulatory Research Associates, Inc.*, Regulatory Focus, Major Rate Case Decisions, January 1997 page 5, January 2011 page 3, and October 2016 page 6.

[2] St. Louis Federal Reserve: Economic Research, http://research.stlouisfed.org/. The yields from 2002 to 2005 represent the 20-Year Treasury yields obtained from the Federal Reserve Bank.

[3] The data includes the period Jan - Sep 2016.

Exhibit MPG-15

Arizona Public Service Company

Equity Risk Premium - Utility Bond

Line	Year	Authorized Electric Returns[1] (1)	Average "A" Rated Utility Bond Yield[2] (2)	Indicated Risk Premium (3)	Rolling 5 - Year Average (4)	Rolling 10 - Year Average (5)
1	1986	13.93%	9.58%	4.35%		
2	1987	12.99%	10.10%	2.89%		
3	1988	12.79%	10.49%	2.30%		
4	1989	12.97%	9.77%	3.20%		
5	1990	12.70%	9.86%	2.84%	3.12%	
6	1991	12.55%	9.36%	3.19%	2.88%	
7	1992	12.09%	8.69%	3.40%	2.99%	
8	1993	11.41%	7.59%	3.82%	3.29%	
9	1994	11.34%	8.31%	3.03%	3.26%	
10	1995	11.55%	7.89%	3.66%	3.42%	3.27%
11	1996	11.39%	7.75%	3.64%	3.51%	3.20%
12	1997	11.40%	7.60%	3.80%	3.59%	3.29%
13	1998	11.66%	7.04%	4.62%	3.75%	3.52%
14	1999	10.77%	7.62%	3.15%	3.77%	3.52%
15	2000	11.43%	8.24%	3.19%	3.68%	3.55%
16	2001	11.09%	7.76%	3.33%	3.62%	3.56%
17	2002	11.16%	7.37%	3.79%	3.61%	3.60%
18	2003	10.97%	6.58%	4.39%	3.57%	3.66%
19	2004	10.75%	6.16%	4.59%	3.86%	3.81%
20	2005	10.54%	5.65%	4.89%	4.20%	3.94%
21	2006	10.34%	6.07%	4.27%	4.39%	4.00%
22	2007	10.31%	6.07%	4.24%	4.48%	4.04%
23	2008	10.37%	6.53%	3.84%	4.37%	3.97%
24	2009	10.52%	6.04%	4.48%	4.34%	4.10%
25	2010	10.29%	5.46%	4.83%	4.33%	4.26%
26	2011	10.19%	5.04%	5.15%	4.51%	4.45%
27	2012	10.01%	4.13%	5.88%	4.84%	4.66%
28	2013	9.81%	4.48%	5.33%	5.13%	4.75%
29	2014	9.75%	4.28%	5.47%	5.33%	4.84%
30	2015	9.60%	4.12%	5.48%	5.46%	4.90%
31	2016[3]	9.64%	3.89%	5.75%	5.58%	5.05%
32	**Average**	**11.17%**	**7.08%**	**4.09%**	**4.03%**	**4.00%**
33	**Minimum**				**2.88%**	**3.20%**
34	**Maximum**				**5.58%**	**5.05%**

Sources:

[1] *Regulatory Research Associates, Inc* ., Regulatory Focus, Major Rate Case Decisions, January 1997 page 5, January 2011 page 3, and October 2016 page 6.

[2] Mergent Public Utility Manual, Mergent Weekly News Reports, 2003. The utility yields for the period 2001-2009 were obtained from the Mergent Bond Record. The utility yields from 2010-2016 were obtained from http://credittrends.moodys.com/.

[3] The data includes the period Jan - Sep 2016.

Exhibit MPG-16

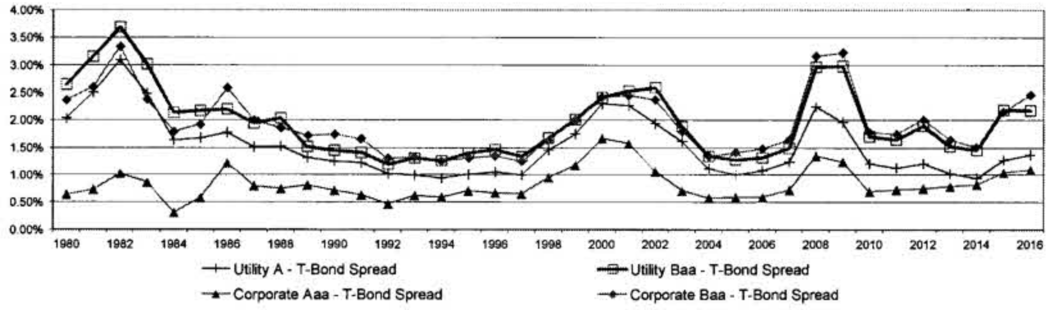
Arizona Public Service Company

Bond Yield Spreads

			Public Utility Bond				Corporate Bond				Utility to Corporate	
Line	Year	T-Bond Yield[1] (1)	A[2] (2)	Baa[2] (3)	A-T-Bond Spread (4)	Baa-T-Bond Spread (5)	Aaa[1] (6)	Baa[1] (7)	Aaa-T-Bond Spread (8)	Baa-T-Bond Spread (9)	Baa Spread (10)	A-Aaa Spread (11)
1	1980	11.30%	13.34%	13.95%	2.04%	2.65%	11.94%	13.67%	0.64%	2.37%	0.28%	1.40%
2	1981	13.44%	15.95%	16.60%	2.51%	3.16%	14.17%	16.04%	0.73%	2.60%	0.56%	1.78%
3	1982	12.76%	15.86%	16.45%	3.10%	3.69%	13.79%	16.11%	1.03%	3.35%	0.34%	2.07%
4	1983	11.18%	13.66%	14.20%	2.48%	3.02%	12.04%	13.55%	0.86%	2.38%	0.65%	1.62%
5	1984	12.39%	14.03%	14.53%	1.64%	2.14%	12.71%	14.19%	0.32%	1.80%	0.34%	1.32%
6	1985	10.79%	12.47%	12.96%	1.68%	2.17%	11.37%	12.72%	0.58%	1.93%	0.24%	1.10%
7	1986	7.80%	9.58%	10.00%	1.78%	2.20%	9.02%	10.39%	1.22%	2.59%	-0.39%	0.56%
8	1987	8.58%	10.10%	10.53%	1.52%	1.95%	9.38%	10.58%	0.80%	2.00%	-0.05%	0.72%
9	1988	8.96%	10.49%	11.00%	1.53%	2.04%	9.71%	10.83%	0.75%	1.87%	0.17%	0.78%
10	1989	8.45%	9.77%	9.97%	1.32%	1.52%	9.26%	10.18%	0.81%	1.73%	-0.21%	0.51%
11	1990	8.61%	9.86%	10.06%	1.25%	1.45%	9.32%	10.36%	0.71%	1.75%	-0.29%	0.54%
12	1991	8.14%	9.36%	9.55%	1.22%	1.41%	8.77%	9.80%	0.63%	1.67%	-0.25%	0.59%
13	1992	7.67%	8.69%	8.86%	1.02%	1.19%	8.14%	8.98%	0.47%	1.31%	-0.12%	0.55%
14	1993	6.60%	7.59%	7.91%	0.99%	1.31%	7.22%	7.93%	0.62%	1.33%	-0.02%	0.37%
15	1994	7.37%	8.31%	8.63%	0.94%	1.26%	7.96%	8.62%	0.59%	1.25%	0.01%	0.35%
16	1995	6.88%	7.89%	8.29%	1.01%	1.41%	7.59%	8.20%	0.71%	1.32%	0.09%	0.30%
17	1996	6.70%	7.75%	8.17%	1.05%	1.47%	7.37%	8.05%	0.67%	1.35%	0.12%	0.38%
18	1997	6.61%	7.60%	7.95%	0.99%	1.34%	7.26%	7.86%	0.66%	1.26%	0.09%	0.34%
19	1998	5.58%	7.04%	7.26%	1.46%	1.68%	6.53%	7.22%	0.95%	1.64%	0.04%	0.51%
20	1999	5.87%	7.62%	7.88%	1.75%	2.01%	7.04%	7.87%	1.18%	2.01%	0.01%	0.58%
21	2000	5.94%	8.24%	8.36%	2.30%	2.42%	7.62%	8.36%	1.68%	2.42%	-0.01%	0.62%
22	2001	5.49%	7.76%	8.03%	2.27%	2.54%	7.08%	7.95%	1.59%	2.45%	0.08%	0.68%
23	2002	5.43%	7.37%	8.02%	1.94%	2.59%	6.49%	7.80%	1.06%	2.37%	0.22%	0.88%
24	2003	4.96%	6.58%	6.84%	1.62%	1.89%	5.67%	6.77%	0.71%	1.81%	0.08%	0.91%
25	2004	5.05%	6.16%	6.40%	1.11%	1.35%	5.63%	6.39%	0.58%	1.35%	0.00%	0.53%
26	2005	4.65%	5.65%	5.93%	1.00%	1.28%	5.24%	6.06%	0.59%	1.42%	-0.14%	0.41%
27	2006	4.99%	6.07%	6.32%	1.08%	1.32%	5.59%	6.48%	0.60%	1.49%	-0.16%	0.48%
28	2007	4.83%	6.07%	6.33%	1.24%	1.50%	5.56%	6.48%	0.72%	1.65%	-0.15%	0.52%
29	2008	4.28%	6.53%	7.25%	2.25%	2.97%	5.63%	7.45%	1.35%	3.17%	-0.20%	0.90%
30	2009	4.07%	6.04%	7.06%	1.97%	2.99%	5.31%	7.30%	1.24%	3.23%	-0.24%	0.72%
31	2010	4.25%	5.46%	5.96%	1.21%	1.71%	4.94%	6.04%	0.69%	1.79%	-0.08%	0.52%
32	2011	3.91%	5.04%	5.56%	1.13%	1.65%	4.64%	5.66%	0.73%	1.75%	-0.10%	0.40%
33	2012	2.92%	4.13%	4.83%	1.21%	1.91%	3.67%	4.94%	0.75%	2.01%	-0.11%	0.46%
34	2013	3.45%	4.48%	4.98%	1.03%	1.53%	4.24%	5.10%	0.79%	1.65%	-0.12%	0.24%
35	2014	3.34%	4.28%	4.80%	0.94%	1.46%	4.16%	4.85%	0.82%	1.51%	-0.06%	0.11%
36	2015	2.84%	4.12%	5.03%	1.27%	2.19%	3.89%	5.00%	1.05%	2.16%	0.03%	0.23%
37	2016[3]	2.52%	3.89%	4.70%	1.37%	2.18%	3.62%	4.99%	1.10%	2.46%	-0.28%	0.28%
38	**Average**	**6.72%**	**8.24%**	**8.68%**	**1.52%**	**1.96%**	**7.56%**	**8.67%**	**0.84%**	**1.95%**	**0.01%**	**0.68%**

Yield Spreads

Treasury Vs. Corporate & Treasury Vs. Utility



Sources:

[1] St. Louis Federal Reserve: Economic Research, http://research.stlouisfed.org/.

[2] Mergent Public Utility Manual, Mergent Weekly News Reports, 2003. The utility yields for the period 2001-2009 were obtained from the Mergent Bond Record. The utility yields from 2010-2016 were obtained from http://credittrends.moodys.com/.

[3] The data includes the period Jan - Sep 2016.

Exhibit MPG-17
Page 1 of 3

Arizona Public Service Company

Treasury and Utility Bond Yields

Line	Date	Treasury Bond Yield[1] (1)	"A" Rated Utility Bond Yield[2] (2)	"Baa" Rated Utility Bond Yield[2] (3)
1	11/18/16	3.01%	4.22%	4.79%
2	11/10/16	2.94%	4.12%	4.70%
3	11/04/16	2.56%	3.81%	4.38%
4	10/28/16	2.62%	3.86%	4.40%
5	10/21/16	2.48%	3.75%	4.30%
6	10/14/16	2.55%	3.83%	4.41%
7	10/07/16	2.46%	3.76%	4.33%
8	09/30/16	2.32%	3.64%	4.26%
9	09/23/16	2.34%	3.65%	4.26%
10	09/16/16	2.44%	3.76%	4.37%
11	09/09/16	2.39%	3.69%	4.29%
12	09/02/16	2.28%	3.58%	4.19%
13	08/26/16	2.29%	3.62%	4.22%
14	**Average**	**2.51%**	**3.79%**	**4.38%**
15	**Spread To Treasury**		**1.28%**	**1.87%**

Sources:

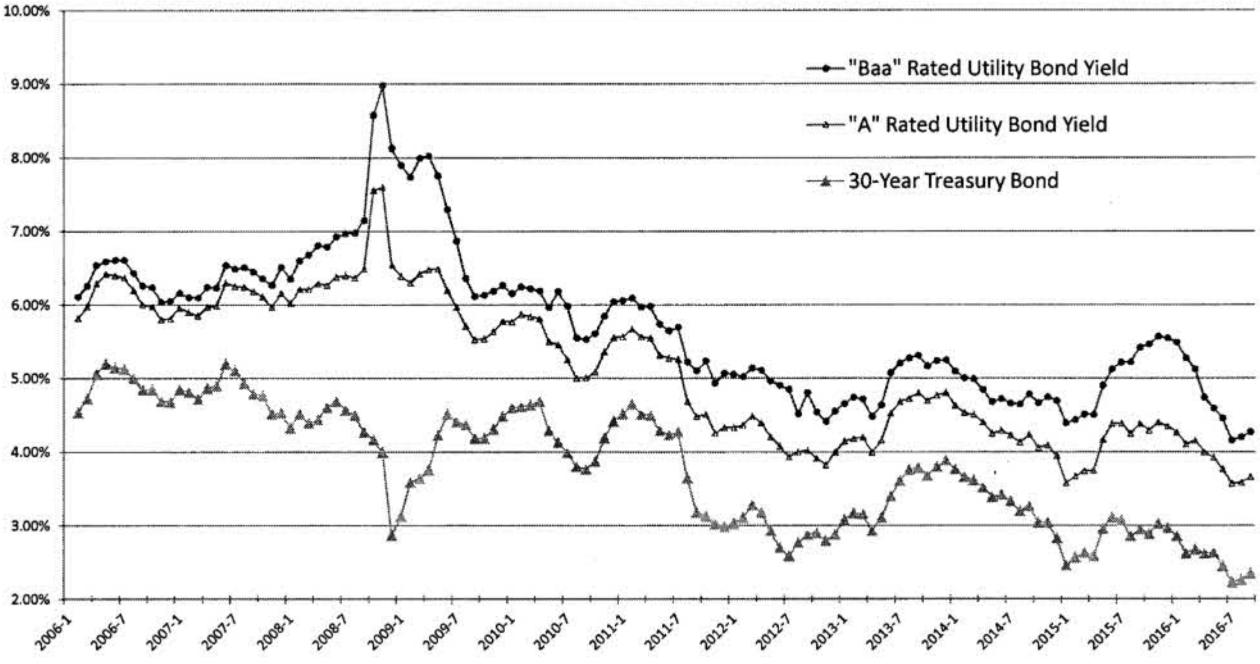
[1] St. Louis Federal Reserve: Economic Research, http://research.stlouisfed.org.

[2] http://credittrends.moodys.com/.

Exhibit MPG-17

Arizona Public Service Company

Trends in Bond Yields



Sources:

Mergent Bond Record.

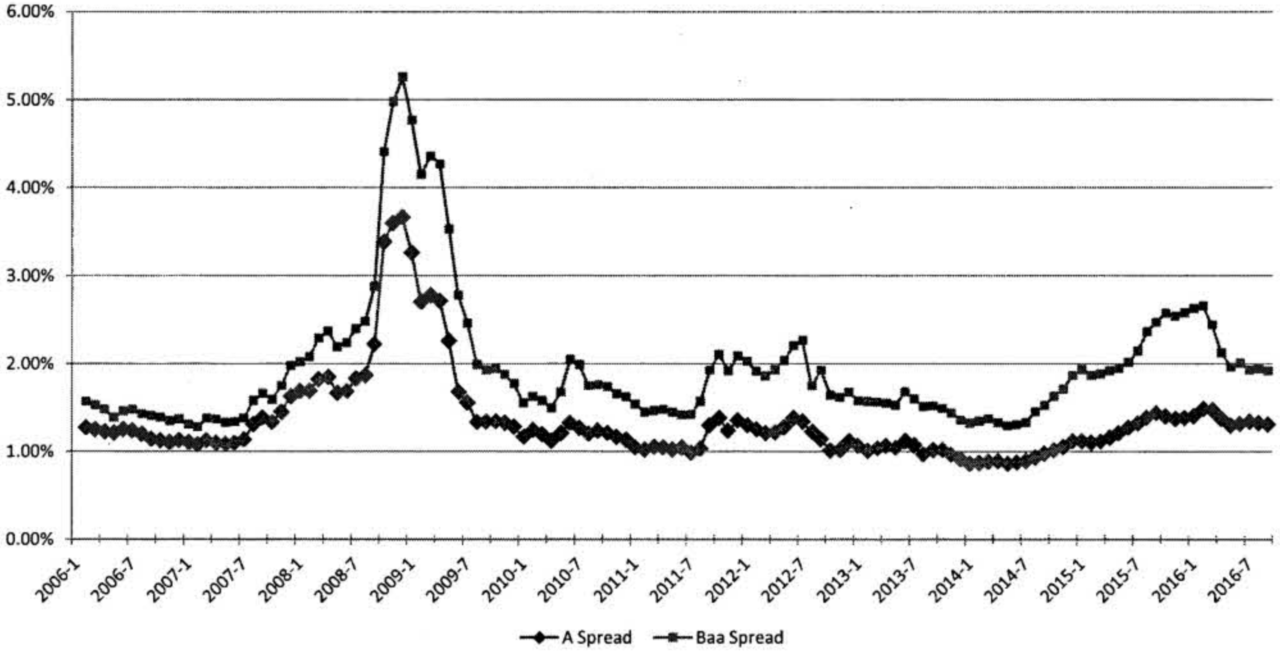
www.moodys.com, Bond Yields and Key Indicators.

St. Louis Federal Reserve: Economic Research, http://research.stlouisfed.org/

Exhibit MPG-17
Page 3 of 3

Arizona Public Service Company

Yield Spread Between Utility Bonds and 30-Year Treasury Bonds



Sources:
Mergent Bond Record.
www.moodys.com, Bond Yields and Key Indicators.
St. Louis Federal Reserve: Economic Research, http://research.stlouisfed.org/

Exhibit MPG-18

Arizona Public Service Company

Value Line Beta

Line	Company	Beta
1	ALLETE, Inc.	0.75
2	Alliant Energy Corporation	0.75
3	Ameren Corporation	0.70
4	American Electric Power Company, Inc.	0.65
5	CenterPoint Energy, Inc.	0.80
6	CMS Energy Corporation	0.65
7	Consolidated Edison, Inc.	0.55
8	DTE Energy Company	0.70
9	Edison International	0.65
10	El Paso Electric Company	0.70
11	Entergy Corporation	0.65
12	IDACORP, Inc.	0.75
13	OGE Energy Corp.	0.90
14	PG&E Corporation	0.65
15	Pinnacle West Capital Corporation	0.70
16	Portland General Electric Company	0.70
17	Public Service Enterprise Group Incorporated	0.70
18	SCANA Corporation	0.70
19	Sempra Energy	0.80
20	Vectren Corporation	0.75
21	Xcel Energy Inc.	0.60
22	**Average**	**0.70**

Source:
The Value Line Investment Survey,
September 16, October 28, and November 18, 2016.

Exhibit MPG-19

Arizona Public Service Company

CAPM Return

Line	Description	High Market Risk Premium (1)	Low Market Risk Premium (2)
1	Risk-Free Rate[1]	3.40%	3.40%
2	Risk Premium[2]	7.80%	6.00%
3	Beta[3]	0.70	0.70
4	**CAPM**	**8.90%**	**7.63%**

Sources:

[1] Blue Chip Financial Forecasts; December 1, 2016, at 2.

[2] *Duff & Phelps, 2016 Valuation Handbook Guide to Cost of Capital* at 2-4, 3-31, and 3-40.

[3] Exhibit MPG-15.

Exhibit MPG-20

Arizona Public Service Company

Standard & Poor's Credit Metrics

Line	Description	Retail Cost of Service Amount ($000)	S&P Benchmark (Medial Volatility)[1/2]			Reference
		(1)	Intermediate (2)	Significant (3)	Aggressive (4)	(5)
1	Rate Base	$ 6,771,151				Schedule A-1.
2	Weighted Common Return	4.55%				Page 2, Line 2, Col. 4.
3	Pre-Tax Rate of Return	9.92%				Page 2, Line 3, Col. 5.
4	Income to Common	$ 308,087				Line 1 x Line 2.
5	EBIT	$ 671,395				Line 1 x Line 3.
6	Depreciation & Amortization	$ 550,431				Schedule C-1.
7	Imputed Amortization	$ 23,409				S&P Credit Portal, downloaded on December 5, 2016.
8	Deferred Income Taxes & ITC	$ 194,817				Schedule E-8.
9	Funds from Operations (FFO)	$ 1,076,744				Sum of Line 4 and Lines 6 through 8.
10	Imputed Interest Expense	$ 21,876				S&P Credit Portal, downloaded on December 5, 2016.
11	EBITDA	$ 1,267,111				Sum of Lines 5 through 7 and Line 10.
12	Total Debt Ratio	52.1%				Exhibit MPG-4, Page 2.
13	Debt to EBITDA	2.8x	2.5x - 3.5x	3.5x - 4.5x	4.5x - 5.5x	(Line 1 x Line 12) / Line 11.
14	FFO to Total Debt	31%	23% - 35%	13% - 23%	9% - 13%	Line 9 / (Line 1 x Line 12).

Sources:

[1] Standard & Poor's RatingsDirect: "Criteria: Corporate Methodology," November 19, 2013.

[2] Standard & Poor's RatingsDirect: "Summary: Arizona Public Service Co." October 12, 2016.

Note:

Based on the October 2016 S&P report, APS has an "Excellent" business risk profile and a "Intermediate" financial risk profile, and falls under the "Medial Volatility" matrix.

Exhibit MPG-20
Page 2 of 3

Arizona Public Service Company

Standard & Poor's Credit Metrics
(Pre-Tax Rate of Return)

Line	Description	Amount (000) (1)	Weight (2)	Cost (3)	Weighted Cost (4)	Pre-Tax Weighted Cost (5)
1	Long-Term Debt	$ 4,203,905	50.00%	5.13%	2.57%	2.57%
2	Common Equity	4,203,905	50.00%	**9.10%**	4.55%	7.35%
3	**Total**	**$ 8,407,809**	**100.00%**		**7.12%**	**9.92%**
4	Tax Conversion Factor*					1.6155

Sources:
Exhibit MPG-2.
* Schedule A-1.

Arizona Public Service Company

S&P Adjusted Debt Ratio
(Operating Subsidiaries)

11 Quarter Average

							Distribution of Quarterly Average		
Line	Rating	Count	Average	Median	High	Low	≤ 50	50 to 55	≥ 55
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	AA-	1	42.63	42.63	42.63	42.63	1	-	-
2	A	9	52.47	51.52	57.18	50.34	-	7	2
3	A-	31	50.80	51.65	63.93	38.36	12	11	8
4	BBB+	28	53.25	54.34	59.37	43.71	5	10	13
5	BBB	8	52.60	52.91	57.04	47.31	2	3	3
6	BBB-	9	56.51	56.74	61.41	51.11	-	3	6
7	BB	1	43.18	43.18	43.18	43.18	1	-	-
8	**Total**	**87**					**21**	**34**	**32**
9	**Average**		**50.20**	**50.42**	**54.96**	**45.23**			

Quarter Results - 2013Q4 through 2016Q2

							Distribution of Quarterly Results		
Line	Rating	Count	Average	Median	High	Low	≤ 50	50 to 55	≥ 55
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
10	AA-	11	42.63	42.79	44.98	40.78	11	-	-
11	A	91	52.50	51.50	60.02	47.70	16	56	19
12	A-	323	50.70	51.43	64.53	31.05	137	118	68
13	BBB+	296	53.33	53.81	63.58	42.12	57	122	117
14	BBB	88	52.60	52.61	60.01	44.64	27	36	25
15	BBB-	98	56.52	56.30	67.82	45.83	4	37	57
16	BB	10	43.18	43.36	45.70	40.02	10	-	-
17	**Total**	**917**					**262**	**369**	**286**
18	**Average**		**50.21**	**50.26**	**58.09**	**41.73**			

Source:
Standard and Poors Global Credit Portal, downloaded November 18, 2016.

Exhibit MPG-21

Arizona Public Service Company

Multi-Stage Growth DCF Model
(Using Villadsen Inputs)

Line	Company	15-Day AVG Stock Price[1] (1)	Annualized Dividend[1] (2)	First Stage Growth[1] (3)	Second Stage Growth					Third Stage Growth[2] (9)	Multi-Stage Growth DCF (10)
					Year 6 (4)	Year 7 (5)	Year 8 (6)	Year 9 (7)	Year 10 (8)		
1	ALLETE, Inc.	$51.84	$2.02	4.20%	4.21%	4.21%	4.22%	4.23%	4.24%	4.25%	8.30%
2	Alliant Energy Corporation*	$65.26	$2.35	5.59%	5.37%	5.14%	4.92%	4.70%	4.47%	4.25%	8.33%
3	Ameren Corporation*	$44.89	$1.70	7.11%	6.63%	6.16%	5.68%	5.20%	4.73%	4.25%	8.96%
4	American Electric Power Company, Inc.	$60.29	$2.24	4.39%	4.37%	4.34%	4.32%	4.30%	4.27%	4.25%	8.16%
5	CenterPoint Energy, Inc.	$17.87	$0.99	1.61%	2.05%	2.49%	2.93%	3.37%	3.81%	4.25%	9.15%
6	CMS Energy Corporation	$38.24	$1.24	6.30%	5.96%	5.62%	5.27%	4.93%	4.59%	4.25%	8.10%
7	Consolidated Edison, Inc.	$70.35	$2.60	3.01%	3.21%	3.42%	3.63%	3.84%	4.04%	4.25%	7.80%
8	Dominion Resources, Inc.*	$70.14	$2.59	5.84%	5.57%	5.31%	5.04%	4.78%	4.51%	4.25%	8.50%
9	DTE Energy Company*	$84.26	$2.92	5.12%	4.97%	4.83%	4.68%	4.54%	4.39%	4.25%	8.07%
10	El Paso Electric Company	$40.31	$1.18	7.99%	7.36%	6.74%	6.12%	5.50%	4.87%	4.25%	8.11%
11	Great Plains Energy Inc.	$27.99	$1.05	6.18%	5.86%	5.54%	5.22%	4.89%	4.57%	4.25%	8.66%
12	IDACORP, Inc.	$68.34	$2.04	3.09%	3.28%	3.47%	3.67%	3.86%	4.06%	4.25%	7.12%
13	MGE Energy, Inc.	$48.72	$1.18	6.39%	6.03%	5.68%	5.32%	4.96%	4.61%	4.25%	7.14%
14	NextEra Energy, Inc.*	$110.89	$3.08	6.97%	6.51%	6.06%	5.61%	5.16%	4.70%	4.25%	7.69%
15	OGE Energy Corp.	$25.89	$1.10	3.25%	3.42%	3.58%	3.75%	3.92%	4.08%	4.25%	8.41%
16	Otter Tail Corporation	$27.22	$1.25	7.45%	6.92%	6.38%	5.85%	5.32%	4.78%	4.25%	10.05%
17	PG&E Corporation*	$54.64	$1.82	8.16%	7.50%	6.85%	6.20%	5.55%	4.90%	4.25%	8.68%
18	Pinnacle West Capital Corporation*	$66.36	$2.50	4.75%	4.67%	4.59%	4.50%	4.42%	4.33%	4.25%	8.30%
19	Portland General Electric Company	$38.83	$1.20	4.56%	4.51%	4.45%	4.40%	4.35%	4.30%	4.25%	7.53%
20	SCANA Corporation*	$63.12	$2.18	4.29%	4.29%	4.28%	4.27%	4.26%	4.26%	4.25%	7.86%
21	Sempra Energy	$94.21	$2.80	9.85%	8.92%	7.99%	7.05%	6.12%	5.18%	4.25%	8.64%
22	Vectren Corporation	$42.02	$1.60	6.15%	5.83%	5.52%	5.20%	4.88%	4.57%	4.25%	8.72%
23	Westar Energy, Inc.	$43.50	$1.44	4.71%	4.63%	4.56%	4.48%	4.40%	4.33%	4.25%	7.80%
24	Xcel Energy Inc.	$38.14	$1.28	4.78%	4.69%	4.60%	4.52%	4.43%	4.34%	4.25%	7.87%
25	**Average**	**$53.89**	**$1.85**	**5.49%**	**5.28%**	**5.08%**	**4.87%**	**4.66%**	**4.46%**	**4.25%**	**8.25%**
26	**Median**										**8.23%**
27	**Average, Nuclear Subset**	**$69.94**	**$2.39**	**5.98%**	**5.69%**	**5.40%**	**5.11%**	**4.83%**	**4.54%**	**4.25%**	**8.30%**
28	**Median, Nuclear Subset**										**8.32%**

Sources:

* Nuclear Subsample

[1] Villadsen workpaper BV_WP03DR.

[2] Blue Chip Financial Forecasts, December 1, 2016 at 14.

Exhibit MPG-22

Arizona Public Service Company

Accuracy of Interest Rate Forecasts
(Long-Term Treasury Bond Yields - Projected Vs. Actual)

		Publication Data			Actual Yield in Projected Quarter (4)	Projected Yield Higher (Lower) Than Actual Yield* (5)
Line	**Date**	**Prior Quarter Actual Yield (1)**	**Projected Yield (2)**	**Projected Quarter (3)**		
1	Dec-00	5.8%	5.8%	1Q, 02	5.6%	0.2%
2	Mar-01	5.7%	5.6%	2Q, 02	5.8%	-0.2%
3	Jun-01	5.4%	5.8%	3Q, 02	5.2%	0.6%
4	Sep-01	5.7%	5.9%	4Q, 02	5.1%	0.8%
5	Dec-01	5.5%	5.7%	1Q, 03	5.0%	0.7%
6	Mar-02	5.3%	5.9%	2Q, 03	4.7%	1.2%
7	Jun-02	5.6%	6.2%	3Q, 03	5.2%	1.0%
8	Sep-02	5.8%	5.9%	4Q, 03	5.2%	0.7%
9	Dec-02	5.2%	5.7%	1Q, 04	4.9%	0.8%
10	Mar-03	5.1%	5.7%	2Q, 04	5.4%	0.3%
11	Jun-03	5.0%	5.4%	3Q, 04	5.1%	0.3%
12	Sep-03	4.7%	5.8%	4Q, 04	4.9%	0.9%
13	Dec-03	5.2%	5.9%	1Q, 05	4.8%	1.1%
14	Mar-04	5.2%	5.9%	2Q, 05	4.6%	1.4%
15	Jun-04	4.9%	6.2%	3Q, 05	4.5%	1.7%
16	Sep-04	5.4%	6.0%	4Q, 05	4.8%	1.2%
17	Dec-04	5.1%	5.8%	1Q, 06	4.6%	1.2%
18	Mar-05	4.9%	5.6%	2Q, 06	5.1%	0.5%
19	Jun-05	4.8%	5.5%	3Q, 06	5.0%	0.5%
20	Sep-05	4.6%	5.2%	4Q, 06	4.7%	0.5%
21	Dec-05	4.5%	5.3%	1Q, 07	4.8%	0.5%
22	Mar-06	4.8%	5.1%	2Q, 07	5.0%	0.1%
23	Jun-06	4.6%	5.3%	3Q, 07	4.9%	0.4%
24	Sep-06	5.1%	5.2%	4Q, 07	4.6%	0.6%
25	Dec-06	5.0%	5.0%	1Q, 08	4.4%	0.6%
26	Mar-07	4.7%	5.1%	2Q, 08	4.6%	0.5%
27	Jun-07	4.8%	5.1%	3Q, 08	4.5%	0.7%
28	Sep-07	5.0%	5.2%	4Q, 08	3.7%	1.5%
29	Dec-07	4.9%	4.8%	1Q, 09	3.5%	1.4%
30	Mar-08	4.6%	4.8%	2Q, 09	4.0%	0.8%
31	Jun-08	4.4%	4.9%	3Q, 09	4.3%	0.6%
32	Sep-08	4.6%	5.1%	4Q, 09	4.3%	0.8%
33	Dec-08	4.5%	4.6%	1Q, 10	4.6%	0.0%
34	Mar-09	3.7%	4.1%	2Q, 10	4.4%	-0.3%
35	Jun-09	3.5%	4.6%	3Q, 10	3.9%	0.8%
36	Sep-09	4.0%	5.0%	4Q, 10	4.2%	0.8%
37	Dec-09	4.3%	5.0%	1Q, 11	4.6%	0.4%
38	Mar-10	4.3%	5.2%	2Q, 11	4.3%	0.9%
39	Jun-10	4.6%	5.2%	3Q, 11	3.7%	1.5%
40	Sep-10	4.4%	4.7%	4Q, 11	3.0%	1.7%
41	Dec-10	3.9%	4.6%	1Q, 12	3.1%	1.5%
42	Mar-11	4.2%	5.1%	2Q, 12	2.9%	2.2%
43	Jun-11	4.6%	5.2%	3Q, 12	2.8%	2.5%
44	Sep-11	4.3%	4.2%	4Q, 12	2.9%	1.3%
45	Dec-11	3.7%	3.8%	1Q, 13	3.1%	0.7%
46	Mar-12	3.0%	3.8%	2Q, 13	3.2%	0.7%
47	Jun-12	3.1%	3.7%	3Q, 13	3.7%	0.0%
48	Sep-12	2.9%	3.4%	4Q, 13	3.8%	-0.4%
49	Dec-12	2.8%	3.4%	1Q, 14	3.7%	-0.3%
50	Mar-13	2.9%	3.6%	2Q, 14	3.4%	0.2%
51	Jun-13	3.1%	3.7%	3Q, 14	3.3%	0.4%
52	Sep-13	3.2%	4.2%	4Q, 14	3.0%	1.2%
53	Dec-13	3.7%	4.2%	1Q, 15	2.6%	1.7%
54	Mar-14	3.8%	4.4%	2Q 15	2.9%	1.5%
55	Jun-14	3.7%	4.3%	3Q 15	2.8%	1.5%
56	Sep-14	3.4%	4.3%	4Q 15	3.0%	1.3%
57	Dec-14	3.3%	4.0%	1Q 16	2.7%	1.3%
58	Mar-15	3.0%	3.7%	2Q 16	2.6%	1.1%
59	Jun-15	2.6%	3.7%	3Q 16	2.3%	1.4%
60	Jul-15	2.7%	4.0%	4Q 16		
61	Aug-15	2.9%	3.9%	4Q 16		
62	Sep-15	2.9%	3.8%	4Q 16		
63	Oct-15	2.8%	3.9%	1Q 17		
64	Nov-15	2.8%	3.8%	1Q 17		
65	Dec-15	2.8%	3.7%	1Q 17		
66	Jan-15	3.0%	3.8%	2Q 17		
67	Feb-16	3.0%	3.7%	2Q 17		
68	Mar-16	3.0%	3.5%	2Q 17		
69	Apr-16	2.7%	3.6%	3Q 17		
70	May-16	2.7%	3.5%	3Q 17		
71	Jun-16	2.7%	3.4%	3Q 17		
72	Jul-16	2.7%	3.4%	4Q 17		
73	Aug-16	2.6%	3.1%	4Q 17		
74	Sep-16	2.6%	3.1%	4Q 17		
75	Oct-16	2.3%	3.1%	1Q 18		
76	Nov-16	2.3%	3.1%	1Q 18		
77	Dec-16	2.3%	3.4%	1Q 18		

Source:
Blue Chip Financial Forecasts, Various Dates.
* Col. 2 - Col. 4.